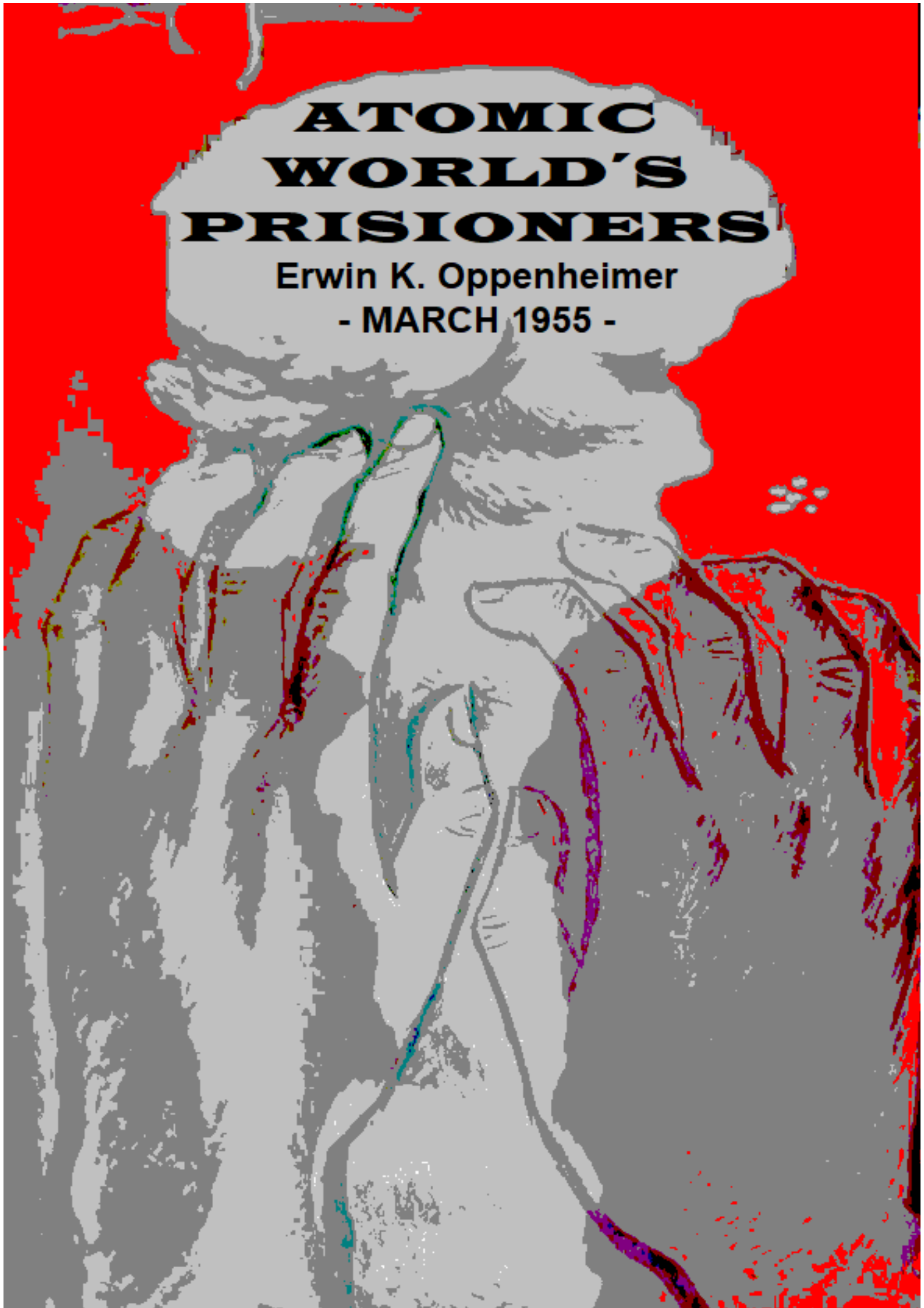


ATOMIC WORLD'S PRISONERS

Erwin K. Oppenheimer
- MARCH 1955 -



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2019 FOREWORD

Erwin Oppenheimer manuscript in german, translated to french and spanish in 1956.

Part 1; Nazi Uranprojekt, Hitler A bomb, 1939-45, led by Gustav Hertz, in three research sites; 1) Innsbruck mountains tunnels, 2) Hamburg Uranium fluoride gaseous U235 enrichment, and Hamburg U235 graphite reactor, and 3) Peenemunde Wernher Von Braun V-3 ballistic missiles. He also unveil, April 27 1945, Adolf Hitler decide what to do with five zirconium A bombs assembled; Trinity Test, Hiroshima and Nagasaki, two for reserve. Robert Oppenheimer A bomb with Cadmium failure 22 August 1945.

Part 2; Erwin, a zirconium expert is brought to Los Alamos (1945-1954), working on the "Super" or H bomb, led by Edward Teller.

Part 3; Erwin imagine an atomic future; Cold War apocalipsis, versus low cost nuclear energy progress. Melting the North Pole by the U.R.S.S.

December 26, 2019
Museo Rincón del Bonete
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URUGUAY

FIRST PART

Part 1

Atomists fight

First part
Atomists fight
CHAPTER 1

I will always remember that June morning ...

Summer in California has never been so beautiful. From the window of my office, I saw the vast green meadow dotted with multicolored flower beds, which extends to the shadow of the redwoods. On the right, next to a massif of rhododendrons, the assortments of the pool said goodbye to their silver jingle. And, repeated by the echo, there was the laughter of Johnny, my son, who was raging his nurse, a good old black woman born in the neighborhoods of New Orleans.

I remember the precise moment I got up and, leaning with both hands on the desk, I leaned forward to follow my son with my eyes. He was trying to remove a leather leash from Doris, his bulldog dog. He looked happy. Her blond hair shone in the light of the American sun. He saw me. He made a sign with my hand and shouted:

- Hello Dad!

I didn't have time to answer him. The phone rang. I soon perceived the familiar voice of a helper, an excellent boy, a Mexican mestizo named Bill Ramon:

"It's a boy" (he is a boy), he said.

Among the technicians of the atom, "It's a boy" did not mean that Bill Ramon's family had just increased with a new offspring. This familiar phrase simply announced that the "ongoing experience" had been successful.

- Is it true? I asked in a voice that I couldn't help but be shaky.
- All this is true, employer.
- Good. Wait for me. I am coming right away.

These minutes will be recorded forever in my memory. Shortly before I let my gaze wander over the radiant nature. Here everything was peace, calm, absolute order and complete happiness. But, a few miles from my Livermore home, a few miles from this man-made paradise, behind huge walls, at the end of a maze of hallways that illuminated the cold neon light night and day, protected by triple armored doors, other men had just obtained a marked triumph by discovering the secret that could end the world.

As a young pagan God, Johnny was now moving in the golden light. If we had not lost the war, it would be called Hans, like his grandfather, and he would have been German. Possibly I would have held my position as a student in the old city of Goettingen. But we

should not dream. His name was not Hans, but Johnny. He was not German, but north american. And I had the imperative duty to become a true compatriot of my son.

I had accepted North American nationality along with twenty-seven former colleagues from the Atomic Research Centers of the Tecer Reich. I had accepted it in the month of July 1954, when I got on the B-29 of the Air Forces that, some days later, had left me at the New York airport.

I had accepted it in the great amphitheater of the Californian University of Berkeley, when the title of citizen of the New World was granted to me by the rector, wrapped in his ceremonial dress. I was standing before him. I stared at him. And don't blink when he finished his speech saying:

-- You have been overwhelmed by the homeland of Liberty. Be worthy of the trust you are granted.

Since that day I struggled to forget. It was not only necessary to stop looking at the past; It was also necessary to accept, adapt. In North America, Johnny, my wife and I were safe. In this century, what more could a country be asked for?

Furthermore, there was hardly any difference between the nuclear laboratories of Hitlerian Germany and

those of democratic America. Our "guardian angels" had the same faces, the same furtive and attentive gaze, the same step both heavy and fast. Today as yesterday, I ignored what a free man was. He was a scientist man chained to his laboratory, a prisoner of his work and of the enormous political-police machinery that was going to take advantage of this work.

- Dad dad...

Ignoring the rose bushes that climbed my window, Johnny had just appeared in his frame. He had in his hands a large ball with multicolored bands. I was somewhat suffocated.

Dad, he repeated, are you coming to play with me?

-No, my son, leave me. I have a lot of work.

He made a face, half sad, half laughing.

- You never have time to play with me, he said. How important is your work?

I did not answer. I got up and approached him. With a gentle gesture so that the child wouldn't be scared, I pulled the blonde head over my chest. Inside was a voice that repeated: "It's a boy." And, at this moment, the feeling I felt towards my son, was not deep love, but a kind of diffuse piety, a mixture of despair and fear.

Johnny dropped his ball, which rolled in the room. I

saw her bounce. It would have fit in my hand. And I couldn't help thinking that, in the future, thanks to my colleagues and myself, a dozen balls of this size would be enough to reduce cities such as Paris, London, Rome, Moscow and New York to ashes.

At this moment, as the images rushed into my mind, I almost had the impression of living a nightmare. As if attending the screening of a movie, I saw Carinhall Castle again, summer residence of Marshal Goering, where we had been conducted about ten years ago.

After a brief wait in a room adorned with famous paintings, we were introduced to his office. But another character was sitting near the Reich Marshal. He had a long, bony, pale figure and fixed eyes behind his glasses. He was the minister of Reich Himmler.

Marshal Goering raised his hand to make the German greeting, but he didn't look at us. His eyes were fixed on a text. We wait in silence.

- Sit down, gentlemen, he said at last, always without looking at us. Reich Minister Himmler will communicate the purpose of this meeting.

Thus we learned that the Italian Enrico Fermi had installed a nuclear reactor in Chicago and that President Roosevelt had just ordered the manufacture

of the atomic bomb.

Naturally, the Fuhrer hoped that the war would end before this "diabolical" weapon could be used. However, it was necessary to insist immediately on the race. We needed to prove to the world that we were as strong as the Americans in regard to atomic decay (as in all other fields).

- Consider today as frontline combatant soldiers, added Reich Minister Himmler. Subsequently, orders will be communicated to you that will establish each of you your residence and the work that will be assigned.

A month later, I was installed in a tiled house a few miles (kilometers) from Innsbruck.

My wife was authorized to accompany me; his sister, who was a member of the party in Bavaria, had guaranteed his loyalty. From Innsbruck I was transferred to Hamburg and then to Peenemunde. Upon the arrival of the Russians, I was evacuated from the latter town and then locked in a prisoner of war camp.

On June 17, 1945, a North American noncommissioned officer told me that, on a higher order, I should prepare myself for a long journey.
-Where are we going? I asked.

He replied dryly:

-You will see.

And, two weeks later, company of Hans K. And Julio W., two companions of Innsbruck, I crossed, in a very elegant Buick, the great forest that borders the highway that goes from New York to Washington.

The military police followed us in two jeeps. I slept when a brake squeak woke me up. Our car took a very sharp turn. After passing a wrought iron fence, we entered a park that I thought was huge and very well maintained. Amidst tree groves, neogothic-style pavilions were seen, similar to the villas that used to be in the residential neighborhoods of Nuremberg.

They were separated from each other by a hundred feet. On the door of one of them, I could see a plaque on which these words were recorded: "Princetown University."

Something foolishly I imagined then that our misfortunes were going to end. I thought we would be treated again, not as criminals, but as men of science. We were probably going to meet our fellow Americans. No doubt they were aware of our work, our successes and our problems. At least we were going to find people with whom we could resume, gladly the dialogue.

There was no sentry at the door of the building in which we were introduced. The room in which they received us resembled that of any well-off bourgeois. The furniture combined the elegance with the comfort that characterizes the North American furniture. A young woman was smiling in the center of the room and was so perfect, her skin was so bright, her look so transparent, her lips so gracefully drawn, that she could have taken it for one of the countless "first page" girls they use American magazines.

He begged us to sit down and asked if we wanted to drink something. At the same time we refused, a door opened and a man we knew very well came in: it was Albert Einstein.

His hair and mustache had turned white. His face was furrowed with more wrinkles than when he spoke to us, a long time ago, in Goettingen. But his eyes were still so alive and so malicious.

They stopped long over each of us and in this look there was something like a friendly greeting. A slight smile bloomed on the thin line of the corner of his lips. Then, abruptly, the smile disappeared. Einstein shrugged. He turned his back on us and, addressing a young man with curly hair and with shell lenses, said;
- Tell the Nazis scientists that they should start by making us a complete report of their past activity.

Recommend them, at the same time, to tell the whole truth if they want your stay here to be enjoyable.

He had expressed himself in English. No doubt he wanted to show in this way that he refused to speak German. This language was, however, that of the country where he was born and had to leave to escape racial persecution.

The young man who performed the interpreter functions advanced towards us and wanted to give us the translation of what Albert Einstein had just said. Don't bother, I said. The three of us understand English.

Einstein turned, as if he had received an electric shock. I point in my direction with his knotty finger.

-Erwin Oppenheimer, said addressing me, I know that if Zirconium has given him much fame. If my reports are accurate, it has even provided you with an iron cross that Adolf Hitler imposed on you in person. I do not have the power to award such a medal, but let me, in turn, congratulate you: the Zirconium will be most useful to the United States Government.

Hans, Julio and I look at each other without saying a word. The welcome of the great sage did not cease to surprise us. Had he come to reproach us for having worked in the laboratories of our country at war?

Julio W. He took the floor:

Is it to tell us these unpleasant phrases that have made us cross the Atlantic?

Albert Einstein let out a scornful giggle.

He rubbed his palms vigorously.

- I know, I know, he said, that you are all the same. They have a sensitivity of skinned cat. Or better yet, innocent. Because, of course, you are innocent. You never did politics. You only worked forced and forced. You only want peace and universal brotherhood ... Others, before you, have told me these hoaxes. This does not prevent a few weeks from being enough for Hitler to crush us all with "his" Uranium bomb, - sorry, with "yours".

He was surprised by our amazement.

- I am aware of all your work, he continued, and it is precisely because I consider them dangerous for the future of mankind that I have insisted close to the Government of the United States to be conducted here and made available to us. They will not be harmed. We are wild, he shouted suddenly, raising his voice. They will be well treated, as human beings. Well fed, well housed and even generously paid. When one is lucky enough to see such a future open before him at a time when he was to fear the rope of a gallows as the only reward, he can rejoice.

Rejoice, then, because in exchange for this excellent treatment granted to you, you are not asked for more than one thing: How have you solved the problems that you know? ...

What projects were they studying when the Russian and American armies crushed the German? I have already told you, I expect from you a full report on these matters.

Without greeting, the father of "relativity" turned round and left. We were terrified. The young man with glasses told us then that we would be housed in barracks located about ten miles from Princetown. There were already other Germans, atom technicians like us.

First part
Atomists fight
CHAPTER 2

The field where we were led then was led by a huge mason-like colossus, which walked bending the knees, as old cavalry officers often do. His name was Colonel Petersen.

The day after I arrived, Colonel Petersen called me to his office and, after shaking my hand with a violence that left my fingers bruised, he exclaimed loudly:

-Are you Erwin Oppenheimer? I wish he would give me a very complete report about you, mentioning everything he knows about Gustav Hertz.

American espionage was not a simple word. Indeed, Gustav Hertz had directed the atomic investigations initiated in Innsbruck. For a year and a half I was under his direct orders. He was a curious, feverish, tormented character, who had a fixed idea: to discover, explain and understand the nuclear reactions that occur in the stars and, if possible, to reproach these reactions.

Since it had been discovered that the essential fuel of solar energy was hydrogen, Gustav Hertz had only one concern: to realize this phenomenon on earth.

However, Himmler had not mobilized him to do deep studies on the combustion of hydrogen, but to manufacture, before the Americans, a bomb of a power never reached. But he never seemed to have understood this well. It is common in scientists who, in the silence of the laboratory, monologue regardless of reality and its obligations.

Thus, Werner Von Braun, who had to invent the V-1 and the V-2, only cared, really about interplanetary rockets. For him, the weapons of reprisal Hitler used against England were nothing more than the reduced models of the rockets he would build one day and that would allow him to land on the Moon or on Mars.

Tal vez es horroroso decirlo, pero él sólo veía experimentos en el bombardeo de Londres con las V-2- En una palabra, para los hombres de ciencia, la guerra no era más que un medio para conseguir laboratorios magníficamente equipados y un campo de investigaciones prácticamente ilimitado. En tiempo de paz, ningún Estado les habría ofrecido semejantes oportunidades. Para ellos, el conflicto mundial se reducía a las dimensiones de una probeta perfeccionada.

Gustav Hertz showed a total indifference to the practical utility that politicians or military could draw from their investigations. Ten and eight hours a day,

sitting at his desk, lighting a cigarette with the cigarette butt he had just consumed, was lost in endless calculations of the energy released by this or that star.

I remember one day I call his office. He was pale. His eyelids moved like those of an underground animal exposed to the bright light of noon. He took me from behind and, in a voice choked with emotion, he said:
-Oppenheimer, I just calculated that the amount of hydrogen found in our globe would be enough to power a propellant device capable of transporting our planet through the universe for a million years.

I did not know what to say. He dropped into his armchair. He raised his glasses as he always did when he wished to contemplate the beyond. However, it was a matter of the hereafter! We were in March 1944. The Russians had just broken our Ukrainian front. Hitler's headquarters rained incessantly, indicating the need to accelerate our work.

The Fuhrer threatened us with the worst punishments, if before the end of the year, we had not sent him his secret weapon. Indifferent to all this tumult, Gustav Hertz let his illuminated eyes wander over the bindings of the books that covered the walls of his office. He was only looking for a way to save the earth from certain destruction that would threaten it within

about eight billion years.

After the attack of June 20, 1944, Gustav Hertz was relieved of his duties and interned for sabotage in a concentration camp located east of Berlin. It was there that the Russians found him calculating (this is how a prisoner who escaped later told me) the total amount of energy contained in the earth's matter. I wanted to show that we didn't need the sun to heat us. According to his theories, the nuclear reactions provoked at certain points of the earth would be sufficient for this purpose for at least a century.

While "clueless" sages are often the main figure in American comedies, the Soviets hardly take this genre of fantasy into account. I have been told that poor Dr. Hertz has been subjected to a sleep cure, followed by a series of electric shocks in order to bring him back to reality. This treatment must have been of some efficiency, since Gustav Hertz is now at the head of the nuclear weapons tuning services in the U.R.R.S.

It is doubtful that the Americans expected anything other than anecdotes, however picturesque, about Gustav Hertz's behavior. They wanted to know, first of all, what state our jobs were in when Gustav Hertz was removed from Innsbruck. On the other hand, I wonder if I could still teach them something. They

knew much more than me.

Indeed, out of a handful of atomic scientists and some politicians, everyone believed that the two bombs that crushed Japan in August 1945 were north american-made. Actually, as I should find out later, these bombs were Hitler's secret weapon.

If I make this revelation today, it is not because I try to give Germany the glory of having been the first nation that released the forces that possibly in the near future can destroy all humanity. It is simply to establish a point in history.

Nor is it a question of comparing the power achieved today by the United States with that which the III Reich had been able to achieve at the time of its capitulation. We were, on that date, in a very primitive stage. Next to the current bombs, our bombs look like Blériot's plane compared to a supersonic jet fighter.

The Nagasaki bomb had a power of 20,000 tons of T.N.T., while the last bomb H, experienced in the Pacific, has a power of 7,000,000 tons of T.N.T., that is, a power three thousand five hundred times greater. In addition, although it is the German technicians from Innsbruck, Hamburg and Peenemunde who have been the pioneers of the nuclear age, it is necessary to recognize that it is precisely north american

scientists who have managed to transform their babble into a language, into a terrible language...

However, it cannot be forgotten that in the month of July 1944, when Gustav Hertz was relieved of his duties, most of the technical problems raised for the realization of the atomic bomb were theoretically solved. In addition, already in 1939 the German scientist Otto Hahn had managed to make Uranium fission. Let's see as quickly and clearly as possible what this means.

In the leek state, Uranium contains two different types of atoms: active atoms of type 235 and inert atoms of type 238. Pure Uranium contains 99.3% of atoms of type 238 and 0.7% of type 235. In other words, there is one Uranium atom 235 for every 140 Uranium atoms 238.

Only Uranium type 235 is explosive. Therefore, the first job has been to isolate this Uranium 235. This operation has been the most difficult of those that have allowed the manufacture of the A bomb.

To make it, a huge factory was built around Hamburg. The German industry sent its most qualified specialists there. Without going into the details that can tire the reader, let's point out, however, that the procedure used at that time consisted, first, in

transforming Uranium (solid body) into UF₆ (Uranium fluoride gaseous body). This gas was collected and passed through several miles of tubes with porous walls.

The pores of these walls had a diameter of 1/250 microns, that is, they were so small that they could only be seen with the help of the microscope. However, they formed as a kind of sieve that allowed certain Uranium fluoride molecules to pass through.

Obviously, it was the light atoms that managed to pass through these porous walls, while the heavier atoms were retained inside the tube. It is understood, then, that Uranium 235, lighter, would pass through the sieve, while Uranium 238, heavier, would be trapped.

It was necessary to repeat this operation thousands of times, since Uranium fluoride had to travel tens of thousands of miles before the desired concentration could be obtained. This primitive technique demanded a huge loss of material. Only seven kilograms of Uranium 235 were collected per thousand thousand kilograms Uranium transformed into fluoride.

For the correct manufacture of this element, a year of trials and work was necessary. But this sacrifice was not too expensive. We had achieved the fissile material from which a bomb could be made thousands

of times more powerful than all the explosives of the past. It was the first step towards the atomic era.

We hadn't really found anything new. The theory of the structure of matter from which the A bomb was to be born was already known. But our job was to put into practice what until then had not come out of the theoretical domain.

If this nucleus is subjected to a cyclotronic "bombardment", it is possible that it captures a neutron. Then, and for very brief moments, this nucleus will consist of 144 neutrons instead of 143. Thus constituted, this nucleus manifests itself absolutely unstable. The balance that had been established between the 143 neutrons, the 92 protons and the electrons gravitating at the periphery of the nucleus has been destroyed.

The nucleus immediately breaks into smaller fragments that release neutrons. These neutrons, in turn, "bombarding" the neighboring nuclei of Uranium 235, cause their fission. It is the beginning of a chain reaction.

But the chain reaction is not yet the explosion the atomic explosion. This only occurs if a defined amount of Uranium 235 receives a cyclotron bombardment carried out in a laboratory, cosmic radiation or shock

from the fission of another Uranium atom 235. If this amount is not obtained, the neutrons expelled from the nucleus are dispersed in the air producing some heat energy, but not causing any explosion. One of the first objectives of our investigations was, therefore, to determine the amount of Uranium 235 needed for the explosion. In our vocabulary of atomist technicians, this amount is called critical mass.

It is easily understood that it was very dangerous to check this critical mass in the laboratory. In fact, it would have been enough for us to get the exact weight in our trial experiments to jump and jump at the same time the city in which we were installed. That's why we try to solve the problem by calculation. After several weeks of work, whose detail might seem somewhat crazy to the initiated world, we come to this conclusion: the critical mass of Uranium 235 should range between twelve and fourteen kilograms.

Immediately a second problem arose. How could the critical mass of Uranium 235 be enclosed in a bomb of sufficiently small size to be transported in an airplane? In other words, what metal, under a reduced volume, would be able to prevent the atomic explosion from taking place before the moment chosen by us?

In solving this problem I worked personally. And it was the Zirconium, produced in the Hamburg reactor

through the fission of Uranium 238, which was ultimately chosen. We'll see why.

In August 1944, a few weeks after Gustav Hertz's dismissal, I was transferred to Hamburg to activate his production and study his employment. My report concluded by recommending the use of Zirconium. Having found this protective metal, the Uranium bomb was already made in principle.

Our first project, which makes us laugh today, consisted of the following: at the ends of an X-tube there were four loads of Uranium, of subcritical mass. The core of the explosion was at the center of this X. There were the four subcritical masses, precipitated against each other by ordinary explosives. Together, these masses represented an amount twice the critical mass needed for the atomic explosion.

At the end of November 1944, it was only necessary to proceed to the assembly of the bomb. Everything left to anticipate that it would be finished on January 30, date of the 12th anniversary of the rise to power of the national-socialist party.

First part
Atomists fight
CHAPTER 3

To our great surprise, an order came from the Fuhrer Headquarters: an order that literally left us dumbfounded. Indeed, after months had not passed a day without receiving criticism and threats related to the slowness with which we dedicated ourselves to our work, Adolph Hitler had suddenly changed his mind. He ordered us, purely and simply, to suspend investigations.

What had happened?

If the testimonies of this apocalyptic period have to be given credit, Hitler had received, at the end of 1944, a very large report of a high German scientific personality belonging to the Kaiser-Wilhelm Institute in Berlin. This report studied the possible consequences of a nuclear experience and declared them dangerous for all mankind.

The heat produced by the bomb, said this sage, must inevitably cause hydrogen to melt, thus creating a phenomenon similar to that produced in the sun. In effect, the sun's energy is obtained by destroying 560 million tons of hydrogen per second.

Now, there are billions of tons of hydrogen on the earth (water, for example, contains 10%). Consequently, the report said, it was possible that the Uranium bomb, when exploding, caused hydrogen to melt. This would release an energy that would cause other explosions, until reaching a chain reaction that would develop over the entire surface of our planet. In this way the earth would have the privilege of shining with a more vivid light than that of the sun. But this light would not last more than a few seconds, at the end of which our globe would have ceased to exist.

The report also took into account that London is bathed by the Thames. A Uranium bomb dropped on Piccadilly would cause the hydrogen to melt from this river. The fire would be transmitted to the sea and end up invading the oceans. The continents would burn one after another like true torches.

Adolph Hitler was a dreamer and a visionary. This report made a deep impression on him. While he wanted the extermination of England, he did not want the end of the world. Because this also implied the destruction of Germany and its own.

During a lunch he made with Goebbels around December 9, 1944, he had exclaimed;
 -These "profax" (this is how Hitler called the teachers) do not doubt anything. Now they have found the

means to blow our planet.

He tried, then, to forget the secret weapon whose realization he had pressed for more than two years. He also believed again in the possible victory for the simple courage of the German army. The offensive that von Rundstedt carried out in the Ardennes was developing favorably. Having had to back off some north american regiments, Hitler declared again, with pride;

-Let's throw them into the sea.

This paralysis of atomic investigations allowed me to take the first Christmas holidays since the beginning of the war. Sad irony of luck; These vacations were too late. Only my house in Innsbruck, just a few hundred feet from the open laboratories in the mountains, remained standing.

My home in Berlin had been destroyed in the course of the great bombing of December 22, 1942. In Cologne, my parents' house had burned on Easter day in 1944. I found nothing of them in the shelter that was to protect them: Ashes of men resemble the ashes of things.

After some initial successes of the von Rundstedt offensive, the impetus of our troops, in their last breath, poorly supported by a material is mediocre

and obviously inferior in number to which the adversary could align, was broken. On the other front, the Russians went on the offensive on January 12. The slow elastic withdrawal began again, since our operations on the eastern front were limited for a year. On January 19 we received the order to resume our work.

But, in a month, the situation had changed profoundly. The factories in Hamburg had suffered terrible bombings. They were practically unusable. The pipes of porous walls that were used for the manufacture of Uranium 235, drew a lace on hundreds of hectares that the bombs had torn apart. Some of these tubes rose to the sky like gloomy columns. From a distance it would have been said that it was a calcined forest, a symbol of desolation and ruin.

However, we had enough time to gather enough Uranium in the underground shelters of Innsbruck to build several bombs. On February 15 we were given the Zirconium tubes whose plans we had designed. They came from Hamburg. It was the last material we received from this city. Indeed, although Hamburg did not fall until the month of May, after the death of Chancellor Hitler, continuous bombardments made it increasingly difficult for all rail and road traffic. Circulation between northern and southern Germany had become virtually impossible.

The technical difficulties created by this situation really delayed, in a few weeks, the completion of the bomb. However, on April 20 it was finished. And the existing Uranium reserve was immediately used in the construction of four other artifacts.

On April 1 I was transferred to Peenemunde, the main base, in the Baltic, of submarines and radio-directed rockets. I had to study the possibility of placing a Uranium bomb in a V-2. In this way I lost all contact with Innsbruck. It wasn't until later when Julio W., who had remained in the Innsbruck laboratory, where he secured the liaison with the military authorities, told me what had happened.

At that time, Hitler already occupied the bunker of the Reich Chancellery in Berlin. Four hundred north american bombers were fierce against the ruins of the capital. To the extent that telephone links and radio transmissions could still operate, the reports that arrived concerning the military situation of the different fronts were disastrous.

At that time Hitler had had a long private conversation with Goering. Subject of the interview: the A bomb. Hitler had a plan. Instead of retiring south, where the last defense of the German fortress was organized, he had decided to stay in Berlin. Goering on the contrary, would move to Berchtesgaden. As the successor of

the Fuhrer, he would have begun to reorganize what could be reorganized. But, officially, I would not take these functions until several days later.

During this time, Hitler would have thrown an Uranium bomb over London and would have committed suicide immediately. This double gesture would have had, according to him, a double consequence. In the first place, the enemies of Germany would have verified that this, although entirely occupied and defeated militarily, had an extraordinary device, thanks to which, before dying it could cause enormous destruction. New York, Moscow, and Paris had been designated as next targets if there was no immediate ceasefire in the front.

Secondly, Hitler had thought that his death would facilitate the ceasefire and that the peace to be followed, thanks to this last atomic start, would be the least disadvantageous for Germany.

With this project of a wild romanticism, Goering had replied that, in his view, it was better to try to negotiate before launching the device. But, according to his custom, Hitler was uncompromising.

Then the Reich Marshal relented. At least in appearance. Well, when he arrived in Berchtesgaden on April 23, he telegraphed his boss to announce: 1st

that he was in charge of the supreme command of all the forces of the German nation, 2nd that he intended to negotiate immediately with the enemy armies.

Upon receiving this telegram, Hitler was angered. He relieved Goering from his position and decided to try to leave Berlin in order to implement his atomic plan.

General Wrenck's army, which was located southeast of the city, immediately attacked the positions conquered by the Russians. He began his advance in a perfect order. His courage before the fire was such that, later, Russian officers expressed their admiration in private conversations. After five years of the greatest of wars, it could hardly be conceived that the soldiers could still move towards death with that impassivity and according to the strictest rules instilled in the military academies.

But this combative value of the Wrenck army was not that of the entire German army. General Heinrici's troops faltered on his left wing. For the first time since 1939, the soldiers fled leaving their weapons. Hitler understood then his weaponry. Hitler understood then that all was lost.

On April 27 he was informed that the Russians and the north americans had met on the Elbe, east of Leipzig. The last hope of negotiating with one

another's backs vanished. He only needed to sign Goering's death penalty and decide the fate of the world's first five atomic bombs.

An ultra-secret telegram arrived in Innsbruck. I advised my colleagues to prepare for any eventuality. Some hours later, they received a second telegram written without a password. It contained four words: The Fuhrer is dead.

According to his latest testamentary provisions, Admiral Doenitz became his successor. Two days later I was called to his headquarters in Ploen, a small port located in the Baltic.

Hitler had put Germany's fate in the admiral's hands because he considered submarines to be the last weapon we had left. He had commissioned Martin Bormann to monitor Admiral Doenitz's use of this weapon. According to Hitler, nuclear material manufactured in Innsbruck was to be transported to submarines and taken by them to Japan. The German fleet still controlled the straits between Denmark and the Scandinavian peninsula. The trip could be tried.

My trip to Ploen had no other purpose. They asked me how it would be possible to transport the bombs by plane from Innsbruck to the Baltic.

-It is necessary to disassemble them first, I said to the

areopagus of officers who listened to me.

A man still young and with a hard gray gaze, interrupted me:

- Orders have been given in this regard, he snapped. I later learned that this character was Martin Bormann himself.

After several interruptions, Doenitz asked me questions about the nature of the new explosive. Then he fired me by telling me:

-Return to Peenemunde. I will send you my orders.

These orders never arrived. Instead, in my prison camp I learned that, at the time of his arrest, the Reich Goering Marshal had pronounced a phrase that, for some, was nothing more than a mixture and that few people, in short, could understand . This phrase was:

"I have refused to use a weapon that would have destroyed all civilization."

This was, quickly summed up, the essential of my report to Colonel Petersen. When I gave it to him, we had a pretty friendly conversation, I can almost say the first friendly conversation he had with our north american "enemies."

At one point I dared to ask him:

-Your friends, the Russians, have almost as extensive knowledge as ours about nuclear energy. Why don't you ask them to tell you? And, if it is true that Gustav

Hertz works for them, the excellence of their reports should provide you with much more information than I can provide.

Colonel Petersen rubbed vigorously and several times his big nose, vodka or our whiskey?

This way of eluding was, in itself, an answer.

First part
Atomists fight
CHAPTER 4

Several weeks and even months passed. It seemed they had forgotten us in Princetown. Albert Einstein and Colonel Petersen had given no more signs of life. In the park, where we had the right to walk tomorrow and afternoon, we only met gentlemen who wore flowered shirts: agents of the F.B.I..

I had received a letter from my wife, Ida. He told me: "I have withstood the test. This has been tough; although much less hard than for many of our compatriots. You can never imagine what these post-war months have been. It is better not to talk about them. Life is only possible for those who know how to forget. "

Ida, later, added: "I currently do like you, I try to adapt. I try to rebuild my life in Frankfurt, where the north americans have given me a job as a typist, which allows me, at least, not to starve. "

This letter kept me ashamed. I was far from the problems posed by the disintegration of the atom, far from tormenting me to know what had happened to the atomic bombs that we had kept in the Innsbruck

caves.

Ida's gaze haunted me day and night. A memory dominated my spirit almost every night. It was a spring night we had spent together, before the war, in the Harz forest, near Braunschweig.

Then we were two students as there are so many in Germany. Ida worked in a laboratory where he made short cinematographic films on scientific subjects. A film, which she had made about the life of fungi and mosses, had been seen by one of my teachers. He had told us about her. He had also introduced us to its author. And we had seen an attractive blonde girl arrive who was smiling with emotion.

The same afternoon we had walked together through the streets of the city. The following Sunday we had attended a tricetto. We had done like all the lovers in the world: we had lent ourselves books and we had had great philosophical discussions about life, about death, about the destiny of beings.

And, later, when the good weather arrived, we had lived that night in the Harz forest. We had raised our tent by the edge of a larch forest. Ida had brought her guitar and played the Zingara way, as wandering musicians who were in southern Germany sometimes did, before 1935.

We had sung together the songs of our youth and we were amazed that our voices were chords. Then, little by little, the silence of the night enveloped us. The screams of the hikers who were camped a little below had ceased. Ida was shivering. I went into the store to get some of my jerseys. When I put it on my back I felt that I was already attached to it.

I muttered very low:

-Ida.

He had given me his hand. Even today, when so many years and so many things have happened, I still feel the weight of his head on my back. In the light of this May night, his eyes had a sweet glow. I had no desire to speak. No word could have translated this perfect union. I knew, I knew with a profound force, that the Lord had just made me the most valuable present he can offer a human creature: he had just given me a companion with whom, at the same time, he would walk the path of life.

We stayed that way for a long time and we have never felt more bound, more united, more sympathetic, than that night in which only our hands joined.

The next day I asked Ida to be my wife. She wrote to her parents in Lower Saxony, but without waiting for her answer, she was mine in my small student room

that overlooked the market square by a large window that, inside, framed waxed frames and, outside, plants of glycine.

I was obsessed with these memories of the past. I read and reread his letter. What test did my wife allude to? What did he understand by shaking his life? The news that came to us from our country through the newspapers or by certain visitors, was so terrible that I had to resist the temptation to commit suicide.

From afar, Germany appeared to us only as an immense quarry of demolition in which women were wandering, miserable decarnate ghosts, with gray eyes, dull skin and of which the victors abused a little for desire, but even more because this was a way to make fun of a defeated nation.

I had reached such a state that even the conversation with my classmates caused me horror. The scientific problems to which I had dedicated the best of my life seemed childish, ridiculous, unimportant. It seemed to me then that the bliss of a being was an infinitely more important thing than the destiny of humanity over which, after all, we have no influence.

I was like this when, in the month of March 1946, a young noncommissioned officer came looking for me. He told me he had been ordered to drive me to "Los

Alamos". A certain person named Edward Teller wanted to see me.

I was startled and had him repeat the name:

-Edward Teller?

-Yes. Why? Do you know him

- Of course I know him!

Edward Teller, whom magazines have later called the "father of Bomb H", was somewhat older than me. Born in Budapest in 1908, of Israelite parents, he belonged to this widespread human type in the former Habsburgs empire who, despite the successes of his personal life, retained the feeling that their lives have been broken by the sinking of your contry.

His father had been a lawyer in the capital of Hungary. I had a villa in the residential neighborhood of Pest, "between that of Count Esterhazi and that of Count Zichy," Teller had told me when I first met him in Goettingen, where he was working as an assistant in the Scientific Research laboratory.

The Esterhazi and the Zichy were among the oldest and richest family members of the Hungarian high aristocracy. In the Austrian Empire, those who bore this name had the right to guard the emperor. His ancestors had not become famous until the fourteenth century, while in the ninth century Esterhazi and Zichy are already found.

The great ambition of the bourgeois in Budapest, especially if they were of Israelite descent, was to get to guard these gentlemen. Edward Teller's father never had permission to do so. But his son, little Ede, had been authorized to play with the children of these illustrious families. Sumptuously dressed, he pulled a wheelbarrow on which an Esterhazi son had sat. He walked it along the avenues of a princely garden. And when he reached the end of his forces, he launched himself into a last gallop that led him in front of the porch of the residence, where he shouted then with all his might.

The "Veser" (the Boss) arrives.

The children played the invasion of Europe by the Hungarian people, an invasion that had occurred a thousand years before. Ede, son of an Israelite lawyer, participated in this memorable historical event. This added to a people proud of having been considered by the nations of the ancient continent as the "punishment of God." In the garden of the village of the Esterhazi, the children made the conquest of Europe, since the Hungarian conquerors of the year one thousand, crossing Germany and France, had reached Spain. This greatness of a missing past was to exercise considerable importance over his life.

In 1918 he experienced a rough blow: the communist

revolution that flooded the country with fire and blood and was directed by Bela-Kun. The Teller family had left the capital in southern Hungary, which was still controlled by loyal forces. There boiled the bustle of the Esterhazi, the Zichy, the Banffy and other descendants of the great stately families. Being in his company transformed this exile into a privilege. Unfortunately, these aristocrats, expelled from their lands by the revolution of the proletariat, remembered that the Telle were Israelites.

Bela-Kun and the main leaders of the insurrection were too. The news that arrived from Budapest indicated that, from the bridges of the Danube, they threw to the river the aristocrats who had managed to stop. Previously, they tied their hands and feet to prevent them from swimming. This news contributed to making the existence of the Tellers unsustainable. Little Ede was expelled from the gardens where he played. They no longer returned their father's greeting. Very soon, finally, they were insulted in the street. They could not leave their home without hearing themselves called "budos jido" (Jewish pigs).

In Goettingen, where we had to work together, he had an excellent reputation. The position of assistant he had obtained allowed him to obtain the highest German university degrees.

His great teacher was Max Plank, whose work on quantitative mathematics had revealed to him, so he said, "not only all the secrets of chemistry and physics, but also had allowed him to penetrate the mystery of creation" .

After a few years of studies, Teller felt a passionate love for Germany. He liked this hardworking, disciplined country, which he would do and conscientiously do everything, taking each project to its last extreme. It felt like home. He was pleased that honorable qualities were first and foremost courage and work.

Disappointed by Hungary, this need for love that every man feels towards a land, be that of his ancestors or the one he has chosen, became even more alive. Edward Teller had only one ambition: to take root in her. I kept nothing from Budapest, nothing more than a female name: Mitzi.

Mitzi was the daughter of a famous doctor who lived a few steps from the Teller's home. Edward Teller had given him algebra lessons, because, very soon, the young woman had been rebellious to mathematics. With infinite patience, the young teacher tried to convince his student of the charm of mathematics. Mitzi did not give up. Edward on the contrary, succumbed to the most obvious charms of the young

woman.

However, also in this circumstance racial issues were opposed to a happy ending of this novel of mor initiated in the shadow of the x and the y. Mitzi's father did not want at any cost that his daughter marry a Jew, although he was able to solve equations of twenty unknowns. In order to definitively undo this feeling that he considered against nature, he sent his daughter to the United States to study medicine.

It seemed to him that the Atlantic Ocean was the best remedy against that wretched love. But the separation fortifies the deep passions. And, in Goettingen, working hard, Edward thought only of Mitzi, of which he had shown me some photographs.

His work and his love occupied him to the point that he did not see the Hitlerian tide rise. We never talked about politics, taking our breaks on long walks in the countryside or playing music. Teller liked Ida very much and it was she who, one afternoon, made him see the danger that threatened her again.

Hitler had just come to power. One of the first laws of the regime had been to ban all marriage between Aryans and Jews. If he stayed in this country he adored, Teller could never marry Mitzi because national socialism was a much more fearsome

obstacle than the girl's father.

Edward Teller remained silent for a long time and then shook his head:

- Come on, he said, I see that it is necessary to take the walking stick again. We are condemned to be eternal wandering.

I tried to dissuade him. Probably the Hitlerian phenomenon that flooded Germany would not be very long lasting. Or, if it lasted, the unfortunate excesses that marked his rise to power would disappear. But it must have lacked eloquence or conviction.

-No, Teller said, I understand very well that it is necessary to leave.

We spent the rest of the evening studying the means that would allow him to continue his studies in North America. I suggested that he try to obtain a Rockefeller scholarship that allowed students to follow courses at certain north american universities.

-No, he said, now no teacher would dare to give the necessary recommendations to a Jewish student, even if he had them a hundred times deserved.

But the idea must remain in his head. A short time later, he left Goettingen to settle in Copenhagen, where the famous professor Nils-Bohr works.

Nils-Bohr had been the first to calculate the amount of energy released by the fission of the atom. Teller's intelligence and vivacity of spirit seduced him. With his recommendation he obtained the Rockefeller scholarship.

But a disappointment awaited him. Representatives of this foundation that he visited in Paris warned him that the fellows were prohibited from getting married "because scientific work and marriage were incompatible," they said. Edward Teller, alone in Paris, became discouraged. He gathered the last cents he had left and phoned Mitzi, who was in New York. This one was laconic:

-I have confidence in you, Edward, he said. Make up your mind. Come.

She had confidence in him, but it is not her ability to "function" in life. It was she, then, who visited the north american scientific media. In 1935, at the age of twenty-seven, Edward Teller learned that he had just been appointed professor at Princetown University. He seemed to have finished his wandering march. In North America, he had found a home and a homeland. This was the man who was waiting for me in "Los Alamos".

First part
Atomists fight
CHAPTER 5

During the journey that led me to him, I wondered with some anxiety what his attitude would be upon my arrival. He had suffered so much as a result of national socialism, much more than Einstein had suffered, that it would cost him to be affectionate. Between the two students, who played Mozart with their violins, a world had sunk into suffering, blood and hatred. I didn't feel up to giving any explanation. But I could not wait for this interview without some fear: it is never pleasant to realize that life, without being avoided, has separated us from those we loved.

Upon my arrival in "Los Alamos", Edward Teller came to meet me as nothing had happened since we had last met in Goettingen. Under his bushy eyebrows, his gray eyes looked friendly. A lock of her hair, always badly styled, furrowed her forehead. Time had dug deep wrinkles in his face. A large blue vein was beating regularly in his right temple. However, despite the traces of time, he had retained his optimistic and communicative smile, this confidence in life that had not left him despite the dramas that had affected him.

Nor had he changed the way he dressed. He wore the

same dark gray suit, something narrow, which he wore when he was seen running down the stairs of the University, with a large package of books under his arm. His striped tie also resembled, like a sister, those worn in Germany before the war.

Without ostentation he put his two hands on my shoulders.

-I'm glad to see you again.

He looked at me for a long time. What did I look for in my emaciated face of a prematurely aged man? Marks of infamy or the features of our missing youth? I do not know. But he took my arm very warmly.

-How are you? He asked me. I just learned about your presence in North America. But can I ask you first about your wife's news? There will not be...

-No, remember, Ida is not dead. He works in Leipzig as a typist in an north american service.

- Will she come here? He asked me.

-Make her come here, don't think about it ... I don't own my person anymore. How could I send over any other?

-Tatata, grumbling. All these humiliating and idiotic measures will not last long. Have confidence in me. I will fix it in the best possible way. Do you want to have dinner with me tonight, Oppenheimer?

-You are very kind, Teller, I replied. But, I repeat, I am not the one who sent.

-Then, he added with a pleasant smile, do you want to be my prisoner?

And, without waiting for my answer, he continued:

-Come on, I'm going to give you a room that will provisionally be yours. Later be notified to eat.

When I was alone, in a very clear room, furnished with a table, a bed, a wicker armchair, a portrait of President Truman, a shelf in which there were some books and a glass of flowers, I could hardly believe that there was been a dream toy. That's how I found myself in "Los Alamos".

I knew, of course, what "Los Alamos" was: the main nuclear laboratory in the United States, located in the mountains of the State of New Mexico. The region is quite desert. A clear forest, located in a wild land, where only a few red-skinned tribes lived decimated by disease and alcohol. Twenty years ago, "Los Alamos" was a small village in the shadow of an imposing building: a huge school, gigantic and of proportions inversely proportional to the number of students who frequented it.

I have never been able to understand why the United States government had built such an imposing school

or building in such a lost place. Perhaps the manifestation of remorse can be seen in this: that of having made the indigenous race of this region disappear.

At that time, the Indians had not tied whites to the torture post for a long time to submit their skulls to horrific experiments. To live, they were content with the miserable salaries that the film producers gave them. Indeed, this region dominated by the wild peaks of the Sangre de Cristo chain, was a wonderful natural scenery for filmmakers. There were going to shoot the stories of cowboys and Indians, and most of the movies called West.

In 1930, a pale and thin young man stopped his car in front of the barracks that served as an office for the notary of the town. Introduced immediately, he declared that he wanted to rent the ranch "Hot Dog", located on the hill at the foot of which Los Alamos had been built.

The contract was signed immediately and the young man disappeared into a cloud of ochre dust. Soon acquired fame of original. During the day, riding his horse that he had named "Chico", he explored the mountain.

Late at night, the hunters returning from their

expeditions saw the yellowish light of an oil lamp that illuminated the windows of their house. The most daring had approached. They had seen the stranger reading large books and regaining their strength, from time to time, with glasses filled with alcohol that he kept in a bottle wrapped in a straw basket.

He didn't talk to anyone, but people had realized, when he went down to the village to make his provision of dried meat, that, from time to time, he was shaken by strong convulsive coughing.

One day he disappeared as he had come. He had said in the mail that he was going to do some commissions in "Santa Fe," capital of New Mexico. He had been seen marching often and stiffly, on his sorrel horse. And he had not returned.

But twelve years later, a long row of luxury cars followed by a real truck train stopped at "Los Alamos." Officers in uniforms and hobby in civilian attire wearing all glasses. In small groups, they headed towards the College. At the head marched the mysterious tenant of "Hot Dog", my homonymous, the scientist north american Robert Oppenheimer.

The US government had commissioned him to install an atomic laboratory in some corner of the country. He had remembered this population, away from any

major agglomeration, protected from the great lines of communication by the "Sangre de Cristo" mountain range and where he had once come to make a cure for health and tranquility. No one had ever heard of Los Alamos at that time. Today this name is on all lips.

It was the year 1942. The war raged in Europe, but it did not cloud the sky of New Mexico. Without hurry, the school was requisitioned. The men of science unpacked their electron microscopes, their centrifuges and their cyclotrons. Wells were dug in the yard so that radioactive isotopes could be buried.

The classrooms were shielded. Windows were walled up. Within a radius of one kilometer, the authorities proceeded to take all the houses. The Indians were rejected towards the mountain. Some, with the dollars they had received as compensation, used cars were bought and marched to practice a nomadic but "mechanized" life, as gypsies do in Europe. Others resolved the housing crisis by acquiring trailer houses in Santa Fe, where a traveling circus liquidated its old material.

Today all this picturesqueness has disappeared. All the inhabitants of "Los Alamos" have a new house, where you can enjoy the most modern comfort. The "redskins" would consider it unworthy to be film troupes. They have become merchants. In its stores,

with air conditioning, the best products in the world are sold. By a curious trick of fate, they who once lived in "reserves", today constitute the only free community of Los Alamos. As for the staff that worked in the atomic center, he lives behind the fences, in small prefabricated houses or in the old restored huts that the Indians once occupied.

Teller had a five-room house at his disposal. Despite the repairs, I could not help noticing that this building had been occupied before by the "redskins". In the dining room of the sage hung three paintings on the wall: two photographic portraits, that of the father and the mother of Eduardo Teller, and the reproduction in colors of a painting in which the old Austrian emperor stood, standing and majestic. Francisco Jose.

Mitzi had remained faithful to Hungarian cuisine. A bold, with the forehead touched with a white lace like the one worn by the maidens in France, served us a smoking goulasch that could have rivaled the best restaurants in Budapest. I was sitting to the right of Mitzi. In front of me were Enrique Fermi, his wife and a stranger who had introduced me with the vulgar name of Arthur Smith.

Arthur Smith did not speak German and we were forced to talk in English. But Fermi sometimes experienced certain difficulties in using this language.

That is why he needed the delicate points of certain reasoning in his mother tongue: Italian. Teller then became an interpreter and translated the phrase of the Latin sage into English and German.

During the meal, Smith said virtually no words. After a few moments, I convinced myself that he was only there to watch us. In the background it was like in Innsbruck, in Hamburg and in Peenemunde, where each sage was followed as a faithful shadow by a Gestapo official.

The presence of this Smith visibly irritated Fermi. He turned his back resolutely, never addressed him when he spoke and made very cruel comments about North America and the Americans.

-It is a formidable country, he said loquaciously. Imagine that when I put into operation the first atomic battery in Chicago, Professor Compton, who at that time was my boss, telegraphed Conant, rector of Harvard University and currently the United States ambassador to Bonn: "the Italian navigator has landed in the new world." !Word! I had to be for them a kind of Christopher Columbus of the atom and, let's not talk about the gestures with which he addressed me! He looked at me from all sides. He was smiling. And he left after an hour, completely dumbfounded, hitting his forehead with his forefinger.

I could barely contain my laughter watching Fermi repeat the faces and gestures.

-Compton, after the history of Chicago, came to ask me what reward I would like to receive, Fermi continued. *"Give me a good bottle of chianti,"* I replied. But these people have as much sense of humor as a steamroller. He took me seriously. He phoned New York to ask at Italian restaurants if they could get one.

He came to see me the next day, very distressed, with a desolate look: *"His Italians have drunk all the chianti of New York to celebrate Rommel's victory in North Africa. And, as you know, we are at war with Mussolini. It is not difficult to get Italian wines. But if the one in California doesn't dislike him too much, I can have him send a barrel. "*

Fermi burst into a terrible laugh that shook Mitzi's dishes. Laura, his wife, intervened.

-Enrico, lascia questo! (Enrique, leave this).

-Bene, face, bene. (Good, dear, good).

It was the first manifestation of a feeling that I should see confirmed later.

Enrique Fermi had never consoled himself of having been forgotten to escape his country. Born in Rome in 1901, he had suffered during his childhood and had to

fight hard to carry out his studies. From a humble family, he had soon clashed with the presumption of the ruling classes and the Italian bourgeoisie. But this was no obstacle for him to adorn Italy and be, at all times, a fervent and exalted patriot.

He obtained his physics diploma the same day that Mussolini made his march on Rome. In 1928, he married Laura, the daughter of a Jewish officer. In 1929, he had been appointed professor of the University of Rome.

Fermi had never opposed the Mussolini regime. However, when Hitler became an ally of the Duce and certain racial laws were also applied in Italy, they began to look for complications. And he preferred to leave.

But, exiled in North America, he continued to proclaim his love for Italy and, even at the risk of scandalizing the politicians who visited him, assured that, without the presence of Hitler and his "damn national-socialism," fascism was the best regime that the Italians had known in the last hundred years.

Such an attitude, although softened by the gentleness and moderation of the sweet Laura Fermi, had caused him nothing but disgust.

Eminent sage, who had provided the United States with the greatest services in atomic research, had been denied permission to spend vacations in Italy for nine years.

He did not obtain his visa until 1954. Upon his return, a throat cancer took him in a few months. But he died blissfully. He had seen his homeland again.

First part
Atomists fight
CHAPTER 6

After lunch we went to the lounge where coffee was waiting for us. We sat in large wicker armchairs and, while we exchanged impressions without order or concert about world political evolution and the relations between science and civilization, Laura Fermi and Mitzi Teller, sitting somewhat apart, quietly calmed as they frequently do the women of old Europe when men start talking about serious things.

I couldn't help but evoke a third face in the shadow that had invaded the corners of the room: Ida's. The food, the comments Teller had made, had encouraged me. Was it possible that everything was arranged in the best possible way? Was it possible that Teller put into practice the project I had outlined and that, soon I would no longer find only my memories, my bitterness, my painful helplessness in this room that overlooked the red earth of Los Alamos?

There was a sudden noise in the hall and then a gallant and athletic man entered. His face was flushed with anger and they had barely introduced us when it exploded. His name was Wendell Radics. Of Yugoslav origin, he was already well known in the scientific

world of the United States.

Wendell Radics came from the house of the great boss, my homonymous, Professor Robert Oppenheimer, whom he familiarly called Bob. He dropped heavily on a chair and exclaimed:

-!I'm fed up! !I'm fed up! There really is nothing to do with Bob. Cadmium, Cadmium, cannot get out of here. And Cadmium is a catastrophe. If we continue like this, in ten years we will be the last atomic power in the world.

I couldn't believe my ears, but before I got over my surprise, Fermi roared:

-I was telling Teller yesterday. It behaves as if it wanted to make a bomb that does not explode and a reactor that explodes to destroy all our facilities.

The mood immediately warmed up and the conversation lost everything I had had until then to become passionate and finally address the problems that had motivated my coming to the atomic capital of the United States.

The answers crossed, rapt and violent, and I had the impression of penetrating into an unknown secret of the whole world and finding again, all united, the threads of a story that the defeat of Germany had

dispersed.

Indeed, in the course of this conversation, the atomic adventure that for me had ended with my internment in a prison camp, was revealed to me again.

The bombs that we had made and that we had buried in the caves of Innsbruck, were never taken to the submarines of Ploen. However, Hitler's insane dream had come true: Japan had received our Uranium bombs, but not in the way imagined by the Fuhrer.

It was not the submarines of the Kriegsmarine that transported the German atomic bombs to the country of the Rising Sun. It was the north american planes that launched them, in August 1945, on Hiroshima and Nagasaki. There was no doubt in this regard. Before an Arthur Smith always so impassive, Teller, Fermi and Wendell Radics spoke freely of this story as if I were one of the initiates.

-I'm glad you're here, Radics said finally turning to me. I know his works on Zirconium. The Zirconium divides Los Alamos into two bands.

And he explained to me the differences that, in the spring of 1946, separated the men of science who worked for the war.

Despite the horrific, but real, results obtained by the atomic bombing that North American had inflicted on Japan, some scientists had not wanted to continue manufacturing Uranium bombs like the ones the German technicians in Innsbruck and Hamburg had prepared. At the head of these scientists was Robert Oppenheimer.

Robert Oppenheimer had little to finish his job when the US secret service agents discovered our atomic artifacts. The greatest men have their weaknesses. Robert Oppenheimer could not admit that other scientists had solved more quickly than he had the problem that had been posed to all.

Anti-Hitlerian, had been deeply hurt that this discovery had been made by scientist Germans who worked on behalf of national socialism. This is why, denying the evidence, he had stuck to his primitive project.

-Bob is infatuated as a child, Wendell Radics explained. He has refused to copy his system. Keep pretending that you can prepare an explosive that is clearly superior to what you have found. And that, therefore, it is not absolutely necessary to make you work in our laboratories.

For this reason, while some of his companions who have been arrested by the Russians are religiously

heard by Soviet technicians, most of the German scientists (which we have collected despite Oppenheimer's orders) are still in the prison camps.

Without knowing it, I was the number 1 enemy of my homonymous. The bomb that he had conceived was no different from ours but in the use of Cadmium instead of Zirconium. Those that had exploded on August 6 and 8 in the sky of Hiroshima and Nagasaki had the separating shield of the subcritical masses of Uranium made with Zirconium. The military high command had declared that the device was perfect. He had simply requested that it be perfected while retaining the same principle.

Robert Oppenheimer had gone further. Fourteen days after Nagasaki, exactly on August 22 (that is, three weeks late on the planned program) the first experimental test carried out with North American-made bombs had taken place in the Alamogordo desert.

These bombs had the Cadmium protective shield. And the result was unfortunate. However, Oppenheimer did not recognize his mistake. Despite all indications of Teller, of Radics, of Fermi, he continued to claim that it was not due to the replacement of Zirconium by Cadmium.

The cause of the failure was, according to him, an error in the explosion schedule. He stated that it had begun before the precise moment. When the four masses of Uranium came into close contact, an important part of Uranium had already dispersed in the atmosphere.

-Do you understand everything grotesque about this situation? Said Radics, which literally boiled. The explosion we have caused on Hiroshima has petrified the world. We were considered as new owners of a shining power. But, in reality, we do not have the secret of this power and, what is more, we refuse to recognize and take advantage of it.

- But the Russians must be aware of all this ?, I asked.

-Everything allows us to assume it.

It was Arthur Smith who, for the first time, had just spoken. He had a weak voice and spoke with his eyes aimed at the sky and his hands clasped around one of his knees.

-Yes, everything makes one suppose and fear, he repeated. The policy that President Roosevelt has carried has been such that our country is today full of Soviet spies. In addition, three of his companions who had remained in the secret factory in Innsbruck until the capitulation of Germany disappeared.

There are 99 odds against a hundred of them being kidnapped by the Russians. This is why it can be said that Stalin is perfectly aware of the truth about the atomic bombing of Japan and our failure of Alamogordo.

-It's pretty sure they're up to date, said Edward Teller. Byrnes himself told me. At the last conference of foreign ministers held in Moscow, when he insisted that the issue of international control of atomic energy be discussed, Molotov turned to him and, with a slight smile, asked: "Do you have by chance A bomb in your pocket? It could serve as a lighter. "

A few moments later, when Byrnes turned to offer him fire, Molotov added: "Wow, don't you have an atomic lighter? Didn't the Germans have invented it? He couldn't make fun of us with more elegance.

- And that will continue for a long time, said Enrique Fermi. The other day I had a discussion on this matter with Oppenheimer. It was a rather sour discussion, I assure you. They already know Bob. He rarely gets angry. On this occasion, however, he has not been able to keep his calm. I was very nervous and at one point I pronounced the words "madness" and even "unconscious betrayal." I realized that he was suddenly pale.

He interrupted me with his dry, little nasal voice, like when he wants to be nasty. "It's you who speaks of treason, Fermi," he said, "Treason to the cause of democracies, no doubt? However, I forgot to say that, in 1935, you wanted to baptize with the name "Mussolinium" your transuranic element.

-Is it true? I asked.

-It's true, Fermi acknowledged.

-Yes, but that's nothing more than maid policy, said Arthur Smith, taking part in our conversation for the second time. Do you think the Russians ask Hertz if he had Hitler's portrait in his room or if he hummed the "Horst Wessel Lied" while shaving in the morning? These are unworthy futures of intelligent people.

-Exact. I completely agree with you, said Wendell Radics. We have carried out a speed race with the Germans, as far as the atomic military team is concerned. We have lost it. The world has changed, the war with Germany is over and the only enemy at our height is Russia. Tomorrow, like it or not, the owner of the world will be the owner of the atom. It is criminal not to use all available means to achieve this objective. Bob's sensitivity puts me in a state of indescribable anger.

Arthur Smith got up and took some steps around the

room.

- And there is a danger that this will get worse, Smith added, as he announced the arrival of Klaus Fuchs to the Alamos. You must have met him, he continued addressing especially me.

-Yes, I replied, we have worked together at the Kaiser-Wilhem Institute in Berlin.

-They were friends?

-No. Actually, outside of work, we didn't have the same hobbies. If I'm not mistaken, he was the son of a Jewish teacher from Prussia. He was a curious boy. He was very shy, but he had strange accesses of aggressiveness. However, it was not bad. I even remember that every time he said something unpleasant, he came immediately to make excuses and seemed upset with his character.

-How long have you not seen him?

-Since 1932, I think. He had to leave Germany a few months before Hitler came to power. I had been told that I was installed in England, but I did not know that I had finished settling here.

-No, he doesn't reside in the United States, Teller said then in his soft voice. He is an English citizen, but he has worked with us during the war and, from time to time, comes to visit us and spends short periods here.

-Passion, in politics, is a very fatal thing, Teller sighed. You can not imagine, my dear Erwin, said putting in his hand on my shoulder, the difficulties that I had to overcome for you to work with us. It was necessary to answer from you. Commit my honor and Mitzi's. And if at any time you are surrounded by a certain hostility, try to think that there are also many men here who do not hold the German people collectively responsible for the crimes committed by certain Hitlerites and that you enjoy all our sympathy and all our affection.

Trust that, very soon, we will be joined by several of his companions and that we can prevent Robert Oppenheimer from carrying out his idea, which is to return "Los Alamos" to the Indians.

-How? I exclaimed. This is not possible.

-However, it is the pure truth. Robert Oppenheimer has no difficulty thinking that peace is definitely assured, that it is not only unnecessary to manufacture Uranium bombs, but also completely useless to work on the hydrogen bomb. And that the discoveries should be used only to modernize the industry.

I would agree with this if the Russians thought like him. But I have motives to fear that it is not so.

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about this conversation. Therefore, the atomic power of the United States was a chimera.

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On the contrary, it seemed that the Russians had some advantage in this field. Because for those who knew them a little, it was natural to assume that the rivalries and discords that separated the scientists from the New World did not disturb the work in the Soviet laboratories.

Accustomed to copying foreign prototypes, they would have evidently reproduced our Innsbruck bombs with all fidelity. Nor was it any mystery to anyone who had

set up our radio-directed rocket factory in Peenemunde. They also enjoyed the Uranium mines of eastern Germany and Czechoslovakia. All of that was really serious.

Naturally, an extreme propaganda campaign was being carried out in the press about the next experimental explosions that would take place in Bikini. But, if I were to believe in tonight's conversation, these tests were not announced under the happy auspices.

First part
Atomists fight
CHAPTER 7

Today, when it is known that the real north american bombs that can be called atomic were launched in early May 1948 in Eniwetok, the feverish enthusiasm that preceded the June and July 1946 tests in Bikini is barely remembered.

These tests had, for the United States, considerable military and political importance. During the months preceding the explosions, a press campaign took place in which all the tricks of Yankee advertising had been thoroughly exploited. Atom technicians, journalists, military attachés from almost every country were invited to attend this manifestation of the New World power.

A year after the end of the World War II, the United States hoped to demonstrate in an amazing way that, thanks to its industrial potential and scientific discoveries, they had nothing to fear from anyone.

In Los Alamos, I had followed with great interest the development of this fever. While the great boss Robert Oppenheimer had refused to receive me, contacts with Teller, Radics, and Fermi had multiplied. I had not

been given a precise task, but each of these scientists had tried to keep me abreast of the progress made in the last two years by atomic science.

It had been necessary, therefore, to swallow a huge amount of reports. I recognize that a kind of anguish invaded me upon reading. In Germany, while I worked on the secret weapons claimed by the military command, I had asked myself the same questions. This conflict that the Hitler government had sought and fed, seemed to me since 1939, a heinous madness.

Hitler probably had, in addition to obvious pan-Germanist dreams, more noble ambitions. It is possible that there are dreams of forming a kind of European federation. Europe, at least the one he wanted to build, would have been a Europe with a Germanic civilization, the only one, he believed, that could impose the supremacy of the white man on the world.

The basis of this political thought can be discussed, but I think it is not doubtful that, to the extent that Hitler had yielded to the military demon, to the extent that he had accepted the war, destroyed all his political victories, ruined the future of Europe and He destroyed this supremacy of the white man he wished to keep.

When I saw, in 1939, my country launched into the craziest of warrior adventures, I sensed that the worst would happen. But this pessimistic view of German destiny did not prevent me from doing what I considered my duty. I would have lived and made this criminal war as a soldier if they had sent me to a combat unit.

I had been mobilized in a laboratory: that's why I had lived and done it as a science domain technician. But, absorbed by my work, I was forced not to reflect on the consequences of this work. They gave me orders. I obeyed. The responsibilities corresponded to those who gave the orders.

Today, everything was different. The atomic adventure had another aspect for me. Had I been petrified by war? My brain had never analyzed the consequences of this extraordinary discovery. I had never thought deeply about everything that the atom can bring to our world and the disorder that will not stop causing our civilization.

But, as I delved into the knowledge of the most recent works, the world of the future was imposed on me as a Dantesque vision. Around me everyone was passionate about the Bikini operation. In the scientific media, divided into two fields, a kind of sports spirit

reigned.

Would Robert Oppenheimer win his fight against the Nazis scientists ? Would the destruction caused in Bikini be more important than those caused by the German bombs in Hiroshima and Nagasaki?

It seemed that the answer to these questions would decide a superiority: was the intelligence of the New World technicians superior or inferior to Old World technicians?

However, I never got to worry about these questions. I cared little to know that our works were superior to those of Robert Oppenheimer. For the first time in my life, I realized the terrible danger with science had just threatened men.

He was undoubtedly the only one who thought so and was in the middle of an amazing joy as the first atomic bomb was dropped on the small Pacific archipelago. It exploded at a height of about 2.000 feet over a concentration of disused Japanese warships.

Around the incandescent sphere where the nucleus of the nuclear fusion was located there was a luminous vibration in the air. For five minutes, an artificial tornado swept the surface of the ocean. Then the calm reigned. Only the vapors that rose rapidly to the

zenith remained in a huge column of smoke. In the sky appeared the symbolic fungus of the bomb.

The phenomenon seemed terrifying to uninitiated observers. It was worth a torrent of epithets and true stylistic exercises in all languages. But scientists were less excited.

Certainly, at point zero, material destruction seemed as important as in Hiroshima. But in Hiroshima the explosive wave had caused light damage twelve miles from the center of the explosion. At 3600 meters it had completely broken the crystals, carbonizing the wooden surfaces, and burning all flammable materials.

At 5,000 feet, the reinforced concrete buildings had collapsed and their metal skeletons were twisted like marshmallows. Anyway, everything that was inside a cone whose vertex was the same explosion and whose base represented a 3,000 feet diameter circle, everything, absolutely everything, had been destroyed.

In Bikini, the important destruction had only taken place inside this cone. Outside, the plates of the ships located 2,100 feet from the zero point had suffered only slight twists.

The pigs that had been placed in the bilge of one of these ships were found trembling with fear but alive. They all died of old age after demonstrating exceptional voracity. On the contrary, radioactivity had diminished the virility of monkeys who had been asked to play the dangerous role of men undergoing atomic bombardment.

In a word, according to the calculations we made later in Los Alamos, the bombs tested on June 30 and July 25, 1946, on Bikini Atoll, only had an explosive power of 11,000 tons of T.N.T. Those that had exploded in Japan, a year earlier, had an explosive power of 20,000 tons of T.N.T.

Despite the brilliant announcements, that had been a failure. Verbal reports were prepared. Before they were locked in a safe in Princetown, which two police officers would keep day and night, Edward Teller read us some summaries.

But then came an order that banned all comments on this failed test. (I have been told that Admiral Lewis Strauss, president of the Atomic Energy Commission, could not consult these documents except in the presence of some of his collaborators).

The official report on Bikini was not published until

1949. And yet it was seriously expunged.

But none of us was fooled and Teller summed up the opinion of each one stating:

-It's a girl (It's a girl).

Expression that, although derogatory for beautiful sex, meant that everything should start again.

For several weeks, Robert Oppenheimer did not appear for "Los Alamos". Teller and his friends were subject to almost total inactivity. We celebrated long conversations together. According to them, there was something more serious than Bikini's failure.

Wendel Radics assured, not without violence, that the Uranium bomb, the famous bomb A, was already outdated.

-So if we use Zirconium instead of Cadmium, as if we effectively refine German bombs, we will be late with respect to the Russians, he said. Because the Uranium bomb, in the current state of atomic research, is practically outdated. Everything suggests that the hydrogen bomb will not have been manufactured within four years.

And this reasoning came to join in my spirit the reports that had been asked of Gustav Hertz. Hertz, in his half madness, had dedicated his entire life to solving the mystery of hydrogen combustion, as it occurs in the

sun. Hertz was a prisoner of the Russians, Hertz worked for the Russians and if he managed to reproduce the combustion of hydrogen as it occurs by producing solar energy, it would not be doubtful that the Russians were soon in possession of the most formidable explosive in the world.

The Americans had not neglected this scientific problem. The scientist Hans Bethe, emigrated in 1933 to the United States, had been the first to demonstrate that hydrogen was the main fuel that entered the production of solar energy. By 1939, he himself had stated that in the hydrogen fission it was not the expulsion of the neutrons that played the main role as occurs in the fission of Uranium 235, but the fusion of the protons, particles that are inside the nucleus.

The electrical charge of these protons being positive, they repel each other with extraordinary force. We learned, in Germany, about Bethe's discoveries and some of us had dreamed of disintegrating the hydrogen atom by transmuting protons from one atom to another. But it had been necessary to resign. Indeed, such transmutations were not possible except at very high temperatures.

Before the atomic era, man was unable to cause these temperatures that no metal could have withstood. The temperature in the center of the sun is

20 million degrees Celsius. Tungsten, which is the most heat-resistant metal known before the war, melted at 3700 degrees and boiled at a temperature of 5900 degrees.

Therefore, it was not possible to conceive of a container capable of withstanding a temperature higher than 3500 degrees, which was totally insufficient, it is more: *ridículo*.

Given this impossibility, other means of provoking transmutations were sought. Gustav Hertz, after years of fierce work and the launch of the Uranium bomb, considered that the fusion of hydrogen nuclei would be possible thanks to the heat caused by the explosion of the A bomb. According to his calculations, this heat should reach 50,000 degrees for a few thousandths of a second.

He also claimed that the fusion of protons would be easier to cause with Heavy Water (which consists of an isotope of hydrogen that, in its nucleus, has a proton and a neutron, while the hydrogen nucleus contains only one proton) .

First, the German laboratories manufacturing Heavy Water were commissioned. The oldest was in Norway, in a factory of the Norsk Hydro Company. The British bombings destroyed these facilities. The German

government considered that it was not possible to build in its territory power plants capable of supplying the current necessary for the production of Heavy Water.

The project was thus abandoned. But the Soviet Union, in peacetime, could afford everything in this domain. Gustav Hertz's presence in his laboratories was significant. We would soon realize it. Indeed, if they saw the first North American bombs exploded in Eniwetock in May 1948, thirteen months later, in June 1949, the Russians launched their "Joe One" in the Siberian Tundra (Joseph First), whose power far exceeds that of our Innsbruck artifacts.

Terrified, the US government, changed its batteries, multiplied the research. On November 1, 1952, the fireball of the first hydrogen bomb was rising in the Pacific. On August 8, 1953, Malenkov announced that the Russians also had the H bomb.

"I have such great confidence in the work of our scientists, that I make this statement before the experimental test of this new weapon" he said.

In North America it was believed that it was a "bluf". But, on August 12, an artifact of one million tons of T.N.T. He shook the Geiger devices of the United States: it was deduced that the center of the explosion

was in the center of Siberia.

Optimists still triumphed by ensuring that North America had a one-year advantage in regard to atomic weaponry. Actually, the bomb that had exploded on November 1, 1952, looked more like a real factory than a bomb. Its power was three times higher than that of the Russian artifact that had to explode nine months later.

But the Soviet bomb could be transported by plane, while ours was not. In truth, until 1954 the Soviet Union enjoyed an undisputed atomic advantage. Malenkov did not take advantage of her. Maybe this would explain his downfall.

The Americans did not overcome their delay until March 1, 1954, when the first bomb H of the Castle operation opened its huge umbrella of 200 miles in diameter over Eniwetok and covered the sailors of the Japanese fishing vessel Fukuryu Maru with radioactive ashes. The lucky dragon) That day, the cry of victory resounded in the Livermore laboratories: "It's a boy" was not a falsehood. The United States has just really taken the lead in the atomic race.

However, if I have allowed myself to outline this rapid panorama of the years that have passed, it is to prove better than in 1946, American scientists added to the

center of the Los Alamos had reason to be restless.

First part
Atomists fight
CHAPTER 8

Bikini's failure was to signal the turn of the atomic policy of the United States. The warnings that had been repeated incessantly Eduardo Teller, Fermi or Radics, began to be taken into consideration. And although at no time was thought to replace Robert Oppenheimer as head of Atomic Research, his activity was somewhat weakened.

I saw him for the first time a fair month, day by day, after the Bikini explosion. It made a great impression on me.

Teller had already warned me:

-You will see ... in front of him, you will not be able to get rid of a certain inferiority complex, he had told me. It is bright, intelligent, deep.

You need to fight the charm that emanates from your person. Only some time after leaving ... in the silence of the room ... redoing all the reasoning he has exposed ... one realizes that his powerful mind is often a simple appearance.

Robert Oppenheimer spoke to me as if he had felt nothing but sympathy for me. We only had a general

conversation. But he knew to give it such a personal tone that, in ten minutes, he had conquered me. I don't know what power this devil of man possessed.

I had not entrusted to anyone the anxieties that dominated me. However, in ten sentences, he had realized this anguish that had not discovered any of those who, since my arrival in the United States, had surrounded me with their friendship.

He made some allusions to the future of the world.

-Do you know a scientist Frenchman named Alexis Carrel? He asked me. It is a true value biologist. He wrote an outreach book that has been very successful here: "The mystery of humanity". In this book Carrel was already horrified that our conscience had not progressed as much as science.

Note that this book was written around 1933-34. That is to say, that Carrel, in fact, had not assisted more than small disorders.

He must have read some surprise in my eyes as he added.

-Yes, yes, I am convinced that what has been seen in the last fifty years is nothing, I understand, nothing compared to what we reserve the next thirty years.

His gray eyes, a little sad, landed on the books that

covered three walls of his office. I had a hard time imagining that this man could feel hate towards someone. After a quarter of an hour he asked if Teller was not wrong and should not be seen, in the accusations he had made against Bob Oppenheimer, more than a manifestation of envy, a feeling that the world of scientists is no more exempt than another.

After having said goodbye with a cordial "see you soon", Robert Oppenheimer accompanied me to the garden, and, somewhat dazed, I arrived at my room. What a strange interview! I did not know if I had been more impressed by the courtesy of the great chief or his silence concerning the matter responsible for my coming here; Cadmium, Zirconium and Hertz's works concerning the H bomb.

Sunk in a large wicker chair, I did not let time go by trying to avoid the curious personality of the head of the North American Atomic Investigations. His family and he too, came from old Europe.

His father was seventeen years old when he left Germany to settle in the United States. He settled in Manhattan and, in a few years, managed to organize an important business of import and exportation of tissues.

When little Bob Oppenheimer came into the world, he

already owned a country house in Islip, near New York, and a luxurious apartment in the city's residential neighborhood. This apartment looked like a museum. Indeed, her mother felt the passion of art and a good portion of the benefits obtained by her husband served to buy paintings by famous painters. In the course of the first talks I had with Teller, my homonymous declared one day:

-In my childhood, nothing prepared me for the harsh and cruel reality of life.

His father, who had suffered cold, hunger and even fear - several of his ancestors had found death in Poland in the course of a pogrom - had done everything possible so that none of this would ever bitter his son's childhood .

At twelve, young Bob read César, Virgil and Horacio in the original, without needing a dictionary. Homer, Plato and Aristotle were also familiar. During the hours that the other children dedicated to their games, he composed French sonnets or wrote articles about polarized light.

Although he had inherited from his mother a very refined taste for colors, it was his paternal grandfather, the old Julio Oppenheimer, who had bequeathed his fondness for the sciences. Bob saw him for the first time in 1909 and a strange affection immediately

arose between the old man and that five-year-old boy. Julio offered Bob the "duplicates" of his mineral collection. And Bob was passionate about these colored stones like rainbows.

The prodigy boy assimilated everything if effort. He did not waste his time attending school. The teachers were going to teach him lessons at home. At fourteen, Bob discovered nuclear science. And, instead of being passionate about the feats of Buffalo Bill and Nat Pinkerton, he wrote to his grandfather: "What more extraordinary thing, what beauty in the symmetry and in the regularity of the laws that govern life and the matter!" .

He completed his higher studies at Harvard University. His best friend was Dante and he had "The Divine Comedy" on the nightstand. But, for Robert Oppenheimer, the vision that the Italian poet had from hell took a scientific form. The devil tormented his victims by liquefying the gas at a very low temperature. Each of the hellish ordeals imagined by Dante had a physical-chemical explanation for Bob.

He was convinced that Lucifer had managed to perform the transmutation of atoms. That was the magic formula behind which all the alchemists of the world had run.

He was only 21 when he received the "Summa cum laude" diploma from Harvard University. From this Latin expression, his father only understood the Latin word, his father only understood the word "summa", which means sum. He gave his son ten thousand dollars (about four hundred thousand pesetas of our day) to reward him for his brilliant triumph.

In American novels, children squander paternal heritage in experiments in which attractive girls represent the dominant element. But sentimental education, even if given by telephone, barely interested the young Oppenheimer. The world has just passed World War I. He used this magnificent money to improve his knowledge and began a kind of tour of the Universities of Europe.

It began in Cambridge, where under the supervision of Lord Rutherford, there was already a team of atomic era advancers. There were the Germans Max Born and Otto Hahn, the Danish Nils Bohr, the Russian Kapitza; in short, almost all those who had to become the great "stars" of nuclear physics.

Robert Oppenheimer stayed two years in Cambridge. It was Kapitza who had the greatest influence on him. -Kapitza literally dissected the atom, he told Fermi one day. His brain seemed to see what was happening inside this tiny and invisible portion of matter. With its

description, the atom acquired cosmic proportions.

Max Born invited Robert Oppenheimer to Goettingen, the German nuclear science center. There, in less than three weeks, the young American scientist wrote his doctoral thesis on "mechanical constants." The president of his court was an honest physicist named Joseph Frank. He explained to us many times what had happened during the exam.

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SECOND PART

Part 2

Teller's Victory

Second part Teller's Victory CHAPTER 1

One morning in August 1949, a superfortress B-29 of the US Air Force flew over the territory that separates Alaska from the Asian continent. He carried on board special plates that allow the photographing of the penetration power of cosmic rays in the Earth's atmosphere. Such clichés are sent to laboratories in the United States specialized in these studies.

The flight was made without novelty. After having traveled the set itinerary, the B-29 returned to its base. The crew chief introduced himself to the commander of the squad:

-Mission accomplished. No news, he declared.

However, a few kilometers from there, the stillness did not reign in the laboratories that had proceeded to the revelation of the clichés exposed in the course of the flight.

The assistant, a Jimmy Hoak, could not believe his eyes. Had he forgotten to turn off the light in the dark chamber? Were the clichés defective? Instead of the luminous lines left by cosmic rays, he was in front of an almost opaque image. It was as if the camera had

photographed a cloud of lobsters. The luminous lines, interrupted by fragments of dusty matter, were directed in every way, drawing a kind of fog.

Jimmy Hoak notified the head of the laboratory, and this, in turn, to a head chief. The three leaned over the plates. The first explanation they came up with, the only logic, is that the B-29 had crossed an atmospheric zone literally flooded with cosmic radiations.

What did this phenomenon mean?

The clisés were immediately sent to the experts. These did not understand the mystery at the moment. A first hypothesis, according to which it would be radiation from a distant star, was abandoned. A young physicist then declared that he had already found a similar concentration of radioactive elements after the explosion of a nuclear bomb.

It is the residues of the umbrella of the atomic fungus, transported by the wind, that conserve this power of radiation.

- But we have not carried out any nuclear experience - the experts exclaimed.

The alarm signal was immediately given. The clisés were sent to Los Alamos. The aviation ministry

instantly sent planes that furrowed the sky between Alaska and Vladivostok. Surprised by this activity - we were at the beginning of the Berlin blockade. The Russians in turn sent their jet fighters over those places.

Soon the "well-informed" media declared that the Americans intended to unleash the war in the Far East to replicate the measures taken by Moscow in Europe. However, it was immediately noted that this was not the end pursued by Washington.

A B-29 was shot down by a Mig. The excitement was considerable throughout the world, except in the United States, where the incident was downplayed and limited themselves to directing a protest note to the Soviet Union. Since what has just been discovered was infinitely more serious than the loss of a flying fortress and its crew.

Indeed, several B-29s had managed to discover the radioactive cloud. Photographs had been taken. Analyzed by the specialists, they gave no doubt: an atomic explosion had recently occurred in Siberia. And, according to radioactive spectra, it was deduced that it was a Plutonium bomb.

At the same time the power of this bomb was calculated. It was six times higher than Hiroshima's.

Naturally, the news was kept secret. However, the high figures of the United States government refused to believe in its accuracy. General Bedell Smith, former chief of the General Staff of General Eisenhower and former US ambassador to Moscow, had just published his memoirs in which he said: "It will be twenty years before the Russians can make an atomic bomb."

The lawyer Luis Johnson, American defense minister, hit his thighs when Admiral Lewis Strauss announced the existence of this Plutonium bomb. It was Lewis Strauss himself who told us the scene two months later. Johnson was literally unscrewing in his armchair, victim of a fit of laughter that made him cry with joy.

The Geiger devices had, however, recorded a violent jolt in the month of July, a jolt that had been attributed to an earthquake that would have taken place somewhere in Siberia. Johnson, who had been appointed by President Truman to condense US military power "into a package of muscles," declined to read the reports he received from "Los Alamos."

His political fortune rested on two words: "budget economy." To achieve these economies, it was enough that the bomb A that Oppenheimer had exploded in 1948 in Eniwetock was the only bomb in

the world.

Enjoying the United States of the atomic monopoly, it was therefore useless to waste the elector's money by conserving and working an important army ground forces, in frightfully expensive laboratories, for the H bomb preparation.

The reports were increasingly alarming, Johnson answered them with a gesture of disdain by saying that they were inventions of the Teller group, which wanted to impress politicians in order to obtain authorization to build the thermonuclear bomb and definitely take the lead on their rival, Robert Oppenheimer.

Poque, despite Fermi and Teller's half misfortune, the struggle had not ceased within our atomic world. Robert Oppenheimer, exploding, in the months of May and June 1948, three bombs in Eniwetock, had erased his failure of Bikini. These bombs, whose destruction power was twice that of the artifacts we had built in 1945 in Innsbruck, seemed to have proved the "boss" right. At least in appearance.

Since, despite the firm security demonstrated by Johnson, President Truman himself began to express fears and express doubts about the alleged US atomic supremacy.

At the beginning of September 1949, a session of the National Security Council was held in which President Truman seemed upset by the reports that were read to him.

Senator Hickenlooper's contained this phrase, which was commented by a part of the press:

-In 1947 I made an inspection trip to "Los Alamos". I was surprised to find almost nothing profitable in case of war.

The situation was such that Teller decided to intervene. He left immediately for Washington, where he told the truth to the influential American senator MacMahon, who threatened the President to make an investigation of the H bomb and about the failures that the Americans had known in their atomic investigations.

Truman immediately appealed to the General Advisory Committee. This, composed of five members, was chaired by Oppenheimer. He met on November 9 to answer the question, formulated by President Truman: -Should the H bomb be manufactured?

The discussion lasted seven hours. Finally, by three votes against two, the General Advisory Committee determined that the manufacture of the H bomb was

by no means useful to US policy, nor necessary to its military plans. Once again, Teller had been defeated by his rival.

From our "jail" of "Los Alamos", we closely followed this deaf war that faced the greatest men of science on earth. While Robert Oppenheimer was still triumphant, the precursor signs of his next defeat were visible, however, everywhere. And I thought about it when, on January 27, while I was shaving, I heard that the radio announcer announced: "Tonight, Dr. Emilio Julio Klaus Fuchs, former head of the work in the atomic weapons laboratory in Los Alamos and head of the nuclear research section of the British Harwell centers, told Commissioner William James Gordon of Scotland Yard that, since 1942, he had regularly transmitted secret scientific information to an agent of the Soviet spy network. "

Three days later, Edward Teller was urgently called to the White House.

"What does Fuchs know?" Asked President Truman.
-All- Teller replied.

And he told the President what had happened the day after I arrived at Los Alamos.

It will be remembered that, during the dinner that brought Fermi, Teller and me together, Arthur Smith

had announced the arrival of Fuchs for the next day. Chaired by Fermi, a meeting had taken place, in the course of which the technical means of manufacturing the H-bomb that the United States had then been reviewed.

Radics had summed up the knowledge and theories of the men of science. Then Teller had spoken. He made an exposition of his plan. Therefore, it had been four years since the Russians could work with Teller's ideas. But the Americans, blocked by Oppenheimer, had not taken any advantage.

Given the seriousness of these revelations, the members of the National Security Council belonging to the Atomic Energy Commission and the General Advisory Committee met at the Navy Ministry on January 31 for the morning. There were twelve. The decision they were going to make affected not only the politics of the world, but also their future. The first to get up was David Lilienthal. He was pale. With a nervous gesture he removed a tuft of hair that fell, rebel, over his forehead.

It could also be seen that his lips were dry and that he was experiencing some difficulty speaking. Standing, he looked one by one at the members of the National Security Council. The silence had become unbearable:

"Gentlemen," he said at last. I am not a man of science, but with all my strength as an American, with all my strength as a man, humbly, in the name of the people who have preceded us on this earth, in the name of the children we will leave, I beg you, I strongly urge you, never to manufacture the H bomb.

He sat. His forehead was covered with sweat and he could not control the trembling of his hands. No one answered him. No discussion was passed to the vote. Of the twelve participants, there were nine abstentions. Two votes, that of Dean Acheson, secretary of state, and that of Luis Johnson, secretary of defense, spoke in favor of the bomb H. Lilienthal was the only one who voted against. When the result was proclaimed, he exclaimed:

-You will respond to your decision to humanity, as Hitler's collaborators responded to your actions before the Nuremberg Court.

But luck was made. In the early hours of the afternoon, President Truman announced on the radio: "I have given the order to continue the manufacture of all kinds of atomic weapons, including the famous superbomb or thermonuclear bomb."

Continue?

The work for the manufacture of the atomic bomb had not yet begun. But could it be said? It was difficult to tell the world that the Russians were surely ahead of the Americans and that they already had a weapon from which we had not yet begun the experimental phase in the laboratories.

Would i say it? This news caused me some joy, I had the impression of getting out of a long dream. I experienced a curious feeling of joy and life. This enthusiasm is one of the things I will always reproach myself ...

I had studied in Germany and we changed some words in German. While I filled out various forms, he circled around me. Suddenly, seeing the first papers I had filled out, he asked me:

-You are married, right?

-Yes.

Dr. Teller told me about his situation- he added. He continues to correspond with his wife, right?

It was an issue I didn't like to talk about. I had not seen Ida since that February 1945 when, to protect her from the bombings, I accompanied her to her parents' house in Altdorf, a small town in Thuringia. It was then thought that the camp would offer a safe haven against the misfortunes of war.

Airplanes are not generally entertained by bombing farms and fields. And also, in the countryside there is always something to eat.

My forecasts were completely false. I had simply forgotten the Russians. One hundred thousand Russian soldiers occupied Thuringia. There is no need to say anything else. Ida, in his first letter, had written: "You could never imagine what the first months after the war have been. It is better not to talk about them. Life is not possible for those who do not know how to forget."

With all my strength I began to forget. Every week his long letter arrived from Leipzig. We had decided to write a diary and send it to us every Sunday. Since this book is devoted to the atomic world that will be the world of tomorrow, I will not talk about this newspaper. It must be recognized, however, that it was this journal and the passion for science that gave me the strength to live and even wait.

Second part Teller's Victory CHAPTER 2

At that moment I had the impression of finding a lost profession again. David Elie Lilienthal resigned on February 15, 1950 from his position as president of the Atomic Energy Commission. His march also lifted the ban that weighed on us, the Germans.

He also pointed to a change in American politics, perhaps also a change in the soul, heart and countenance of this country.

Lilienthal was one of the last survivors of the Roosevelt Era. Like Morgenthau, minister of economy of Roosevelt and author of a plan that foresaw the dismantling of German industry and the transformation of Germany into an agricultural country, he detested everything Germanic.

During the war, he had demonstrated fierce energy, allied to an unusual intelligence and work capacity. Hitler defeated, Germany suppressed as a great power, he saw no reason that could justify the permanence of the US army. The only thing that interested him was the peaceful use of atomic energy. He was, of course, the ally of Robert Oppenheimer

and, therefore, the adversary of Edward Teller.

However, the two men were almost compatriots. David Lilienthal's father left his homeland at the end of the 19th century, as if he had already foreseen the calamities that would fall on the Jewish communities of Central Europe.

He had been concerned about Bismark's policy that, protecting the development of the Israeli communities in the Balkans and in Germany, had caused, on the one hand, the mass emigration to Austria-Hungary of Polish and Russian Jews escaping from the pogroms and, on the other, the anti-semitic campaign unleashed by the German Steiner.

This passionate reaction had convinced him that nothing lasting and solid could be built in old Europe dominated by violence. Poor, but young, hardworking and intelligent, he decided to change the Austro-Hungarian empire to the mid-American West that industrialization began to value.

Fifty years later, seeing how Hitler fulfilled his father's bleak prophecies, David Lilienthal felt a deep hatred for everything that was German. This hatred had no limits when, in 1946, he tried to locate his family members living in Europe and learned that they had all died in the concentration camps.

His resignation had the immediate consequence of having recourse to our services. I had benefited until then from a mixed state. But the US administration still considered me a prisoner of war.

On July 6, 1950, I went back to the field office I had left. I signed the control register for the last time and went to Sandia, a neighboring factory in Los Alamos, where atomic weapons had been stored for two years. I was greeted by a French, naturalized north american, who was the chief of staff this factory.

The weeks passed, and the months, and even the years. Punctual, Ida's letters and mine crossed in the Atlantic sky. In this way, our hearts had not interrupted their dialogue even one day since the night of Harz. But it was difficult to explain these things to the excellent Georget. (Such was the name of this Frenchman who brought together the two qualities of France: gentleness and generosity).

-It will do well to rent a large house immediately- he told me after a moment of silence. In a few weeks it will be too late, you will not find a house to rent and you will find yourself poorly housed.

-Do you think my wife will be authorized to move here? I asked blushing and turning pale at the same

time.

- "Why not?" Georget added with a pleasant smile. French law is the best. And what does French law say? He says the wife should follow the husband everywhere. I do not understand why your wife is no longer with you.

He lowered his voice and continued, making a funny face:

- On the other hand, American women, both for the kitchen and for the rest, are worthless. I have brought mine from Job (Puy-de-Dome).

- But how can I do it?

- Dr. Teller has already requested authorizations. You will not have to do anything other than sign. And in ten days ...

- Could you be here in ten days?

- !Clear!

I would have kissed his hands.

- "But do you have money?" He frowned.

- No.

- Ah, this is more annoying. And she neither?

- She works as a typist and I don't think she could save the money needed for such a trip.

- Good. I will see Mr. Bradbury, the director. Efforts will be made to advance you a small amount.

And he did it as he had said.

However, I was very afraid that I would have hidden the truth. Since Norris Bradbury did not show the same kindness to my presence. Without Teller's high protection, without Georget's guidance, it would have been several months before I was in possession of the necessary authorizations. The interview I held is Bradbury, the day after my arrival, he lacked all cordiality.

- Do you want to make your wife come? Roaring; Here are the Teutons. They are given a hand and they want the arm.

-I haven't seen her for five years- I said calmly trying not to show anger. You cannot retain me as a prisoner of war throughout my life. If I am undesirable, let me return to my country.

-You will do what you are ordered and start first by holding back- he shouted. In addition, it seems that the Russians were taken prisoner by his wife.

I did not answer. He continued:

-Do you know what has been done with women in Germany?

I still didn't answer.

- Besides, Mr Oppenheimer, I think that they have not been done enough. It would have been necessary to crush all of you under our tanks to make them atone for the crimes they have committed.

I was standing in front of him. I remember sweat running along my face. I thought of Ida. He told me that his coming was worth some suffering and some complementary humiliations. I also told myself that, after such a war, it was very understandable that such hatreds existed and that there was only one way to end them: it was, despite what it cost, not to return hatred for hate. It was not within my reach to feel appreciation for Norris Bradbury. But it was possible for me not to hate him.

Personally, I had never been interested in politics. Being still very young, I had sunk my head for the first time in the ocean of science. The only party I had joined was that of the laboratories in which the mysteries of the atom were intended to penetrate. Inside the smallest fraction of matter, I had discovered a whole world.

At the time when the Germans were divided into national socialists, communists, social democrats, Christian democrats, it was the struggles and loves, marriages and divorces of protons, neutrons and electrons that made me passionate. In the still unexplained relations of the proton and the neutron, we found, my comrades and myself, the subject of endless discussions.

Do they behave with each other like lovers? Are they together the center of a solar system around which electrons gravitate like planets? Are they allies or adversaries who sometimes help each other or try to destroy themselves like nations ?; and many other questions filled our work days, our moments of rest and persecuted us even in our dreams.

But soon I had stopped being a student to become a "scientist man." And politics had locked me inside a test tube. Each of my gestures had been watched, my letters had been opened, my telephone communications heard and, in the room we had in Innsbruck, Ida had discovered a recording microphone behind the reproduction of a Dürer's painting.

Hitlerian police, like the American police, did not ignore anything about me. On the contrary, if he had slapped Bradbury at this time, he would not have stopped being under his watch. Until my death, I was a prisoner of the atomic world. Later, one of my friends had to check all the solidity of the barriers that the modern world raises around its men of science.

If I tell his story here, it is because it allows you to better understand why I did not rebel against the insult. His name was Raymond Hardt. He was one of my mates in Livermore Atomic Center. We worked in

the same laboratory.

Excited by the permanent vigilance to which he was subjected: censorship of his correspondence, discrete inquiries carried out at his home, interrogations of the friends he frequented, etc ... tried to save the wall behind which science had locked him. Presenting his resignation would have been of no use. The agents would have chased him everywhere. Indeed, it takes at least ten years for an atomic problem to lose its secrecy.

For Hardt, then, it was not about resigning. He resorted to a subterfuge: he simulated total amnesia. He prepared a car accident from which he came out, shocked, with an emptiness of twenty years in his memory. Naturally, he was sent for observation to a psychiatry hospital and managed to deceive psychiatrists. Their report was clear: "Raymond Hardt has returned to 1938. He does not remember anything that happened next," doctors told police.

The services of the F.B.I. They were not satisfied with this. They decided that Hardt would be admitted for the rest of his days or until he regained his memory. Raymond Hardt thus became a prisoner of a madhouse. Since then he had only one way left to circumvent police surveillance: one morning, he opened his veins in his bathtub and took, to Paradise,

the secrets of the Livermore atomic center.

It was too late to choose another path. I was atomic technician and technician would follow. My luck would not have been brighter if it had been "kidnapped" (abducted) by the Russians.

Teller had found a former colleague Innsbruck (whose name is kept secret by the F.B.I.) and had done, in 1947, the unusual feat of escaping from a Soviet factory in which he was detained. According to the statements he had made to the American secret service of Neustadt (Germany), about two hundred German technicians and scientists were in the U.R.S.S .

Since 1945, they had been concentrated near Moscow and then sent to nuclear research centers located in Siberia. There they had all the necessary facilities for their work. Its material existence was splendidly assured (one thousand two hundred to two thousand dollars per month). Luxurious villas and a skilled staff were put at your disposal. But, they had never been authorized to work with their Russian colleagues.

Each of them had been confined to a limited, autonomous task. The results of their work were centralized in a meeting to which they had no access.

In short, they obeyed a central brain that virtually ignored everything. According to Teller, this central brain had two names: Bruno Pontecorvo and Peter Kapitza.

In the United States, things were different, but we were away from the main jobs for a long time. Lilienthal's resignation had diminished Robert Oppenheimer's power, but the aura of his personality was such that he still reigned as owner in the atomic center of Los Alamos, and in the political center of Washington. "He is the only authentic genius I know," Lilienthal had said of him.

"It's the brightest intelligence I've ever known," said Dean Acheson, Foreign Minister of President Truman. Every day, universally known scientists like Einstein, Bethe, Selig-Hecht, Isidor Rabi, Edgar Muller, Van Schild, Georges Pegram, Robert Bache, Freddy Seitz, Harry Brown, Leó Szilard, Steiner, wrote articles dedicated to glory in scientific journals from Oppenheimer.

This was enough for Teller to fall out of favor, although the facts, day after day, came to prove him right.

Only Ernest Orlando Lawrence, director of the laboratories of the University of California and Luis Walter Alvarez, professor of Physics at Berkeley,

differed from the official opinion, to join the team grouped around Teller. Alvarez had even paid his courses, which represented his only income, to come to work with the father of the H bomb.

More prudent, more flexible too, Lawrence had retained his university occupations that allowed him to penetrate deeply into American political media. It was he who, like who does nothing, had begun to ring the alarm bells.

He did it, in a simple way, at the end of a past evening, in a night club with some influential senator. The conversation always ended considering the next elections. And Lawrence said;

- I do not want to be in the skin of those senators who have protected the fumisteria of Los Alamos.

-And why? - the senator asked, suddenly interested.

Lawrence then told his little story, at the end of which he stressed that the American people would not stop asking for accounts from those who had failed to raise, above their head, the atomic shield.

These conversations, repeated, carried out without passion, marked by the good sense of the best citizen, were much more effective because Lawrence was not a foreigner like Teller and his immediate assistants, the Polish Emil Konopinski and the

Germans Frederick de Hoffmann, Lothar Wolfgang Nordheim, John von Neumann.

Lawrence was a descendant of a family of colonizers who, in 1843, had left Missouri and crossed the great meadow to save the Mountains and through the great meadow to save the Rocky Mountains and settle in the rich plains of the Pacific. This trip, which had lasted four months, was part of the Lawrence family mythology and belonged to the great epic of North America. When there were grandparents who had made their way in the West, they had the right to intervene in the affairs of this country.

While working for Teller, Lawrence indicated the tactics he should use to reach his goal.

-"If you only had Hans Bethe by your side!" He said one day.

Bethe had been the first to describe the processes of hydrogen fusion in the Sun.

He was also the only German in the Oppenheimer group. Finally, in the course of a long visit to Los Alamos, Bethe had become friends with Teller.

He visited him several times and Teller managed to convince him. Having a large family in charge, the man of science simply requested a salary guarantee before leaving his position as professor at Cornell University.

Lewis Straus, who in 1953 was to become president of the Atomic Energy Commission, managed to give it to him.

Everything had already been decided when Bethe asked for a few days to reflect. A few days later a letter arrived. He indicated to Teller the resolution of the scientist: Bethe had finally decided not to join his project. It was later learned that Oppenheimer had come from Washington by plane and had spent the night to make him change his mind.

Teller then decided to take the bull by the horns. He went to meet Oppenheimer himself. The interview was very cordial.

"Don't you think I put obstacles in it, Teller," said Oppenheimer. On the contrary, I am willing to help you. Tell me the people of Princetown and Los Alamos you need and consider them your own. I will give the orders to be immediately available.

Full of hope Teller, immediately prepared a long list of technicians and left, convinced of the good of Oppenheimer. Never heard of this list again. He never saw the technicians he needed arrive. On the contrary, the only answer he got at his request was a fierce press campaign that Einstein started. In a call to

the American nation, Delcaró: "If the thermonuclear weapon is manufactured, the destruction of all life on earth will have been theoretically made possible."

Bethe, fearing undoubtedly a new increase in his family, also made a radio statement in which he said: "that the neutrons released by the explosion of the H bomb will produce radioactive carbon 14, which would retain its toxicity for five thousand years and poison the atmosphere".

Every month, The Bulletin of Atomic Scientist, published by the Oppenheimer group, was devoted to the danger of the new explosive. Thing still never seen in the scientific media, he asked the men of science not to participate in the new discovery, multiplied the warnings and tried in a thousand ways to create a climate of panic.

It was necessary to wait for the Korean war for this climate to change definitively.

Second part Teller's Victory CHAPTER 3

However, it was still the scientists grouped around Oppenheimer in the Atomic Science Bulletin who took the offensive.

Until then it had been declared that North America had no need for the H bomb for its safety and that the communist danger had actually been greatly exaggerated. The violent attack by the Chinese in Korea came to refute this argument. Another was found immediately. An extensive report was sent to the military and politicians in Washington. The conclusions of this report were intended to demonstrate that Teller's project was nothing more than a fumistery.

According to the calculations made by the scientists who had signed this work, a temperature of 100 million degrees should be produced for 1.2 millionths of a second to cause the fusion of the heavy isotopes of hydrogen: Deuterium and Tritium.

“...For his thermonuclear project, Edward Teller needed more and more heat for longer and longer periods in the atomic explosions before he would have an effective thermonuclear “trigger,” or “match.” The wartime bomb generated

50 million degrees for 1.1 millionths of a second. He knew from his study of reaction times that a mixture of hydrogen's two heavier isotopes, Deuterium and Tritium, in their liquid form, would "ignite" in 1.2 millionths of a second at temperatures of 100 million degrees.

The improved atomic bombs brought him within range of a Deuterium-Tritium "fire" that in turn might "boost" an atomic explosion to the 400-million-degree temperatures that would ignite other possible thermonuclear fuels, more readily available than Tritium. One possibility was liquid Deuterium. Thermonuclear weapons made entirely of Deuterium-Tritium mixtures were virtually out of the question because of the tremendous cost in money and atomic resources of manufacturing Tritium. This point had been heavily labored by the AEC's General Advisory Committee.

SOURCE: "The Hydrogen Bomb: The Men, the Menace, the Mechanism", by JAMES SHEPLEY,

Head of the Washington Bureau of Time and Life and CLAY BLAIR, JR.

https://archive.org/stream/B-001-014-179/B-001-014-179_djvu.txt

Tritium is not found in nature. To make one gram of Tritium (calculated the scientist friends of Oppenheimer) 18 grams of Plutonium had to be sacrificed. Plutonium was, it will be remembered, the element used in A bombs, experienced by Oppenheimer in Eniwetock in 1948. Consequently, in the need for the production of Tritium significant quantities of Plutonium, series production of A bombs would be delayed.

Wanting to provide North America with a superb bomb, it would begin by preventing it from possessing those that were easy for it to obtain.

This was not all. This heavy hydrogen isotope was also radioactive. It was consumed slowly. In six years

he lost a quarter of his neutrons. In twelve years it was transformed into helium, thus losing half its mass. Therefore, it was impossible to make reservations for war. This was the second argument used by Eduardo Teller's adversaries.

There was a third.

In order for the mixture of Tritium and Deuterium to occupy a volume as small as possible, it is necessary to liquefy them and keep them at a extremely low temperature of -233°C . Instead of a bomb, the thermonuclear device would end up resembling a true refrigeration factory, a huge steel thermos, so bulky that no aircraft would have been able to transport it.

Presenting this report to Dr. Conant, rector of Harvard University, Oppenheimer released, ironic and contemptuous;

-It's just a miserable thing. To take it to the target, it would be necessary to drag it by oxen.

It is doubtful that these conclusions would significantly lower Teller's actions. In summary, the situation presented itself thus: Teller and his friends wanted to show that thermonuclear weapons were due to mastery of the possible. Oppenheimer and his disciples struggled to prove otherwise.

But, since they had in their hands the research

laboratories, at the same time they said: "It is crazy", prevented Teller from demonstrating the opposite by manufacturing the H bomb.

Having failed diplomacy, intrigues and fighting in the official centers, Teller decided to ignore the Oppenheimer interdictions and get to work. He came to Sandia to give us precise orders. They were there Konopinski, Neumann, Hoffmann, Notheim, and mathematician Ulam.

As a starting point for our work, we take the first Los Alamos report sent to Washington: "The" match "of Uranium can result in the fusion of hydrogen isotopes with the condition of developing a temperature of at least 100 million degrees for a minimum of 1.2 millionths of a second. "

To respond to the first arguments of the collaborators of the Bulletin of Atomic Science, we decided to immediately eliminate the inconveniences of a practical nature: the volume of the H bomb and the wastage of Plutonium.

These imperatives required that we could substitute Deuterium and Tritium for a mixture that occupies a smaller space and that we find the means of feeding the temperature at which the "match" of Uranium exploded. It was this last problem that was first

solved, thanks to Edward Teller's intuition.

"If we increase the density of the mass of Uranium 235 and Plutonium," he suggested, "we can surely get a more powerful explosion." It is interesting, therefore, that we first perform a compression of these elements.

How? The thermal procedures offered no solution. Several hundred degrees below zero would have been necessary to exert a significant influence on the already compact structure of Uranium and Plutonium. As for the heat, it would have exerted an opposite effect.

But luck was with us. One day, while Eduardo Teller strolled along the fences that line the Los Alamos field, his attention was drawn to a boy who, with the help of a board, struggled to crush a pile of sand.

"Hey, he also wants to compress the matter," said the Hungarian sage, amused.

And, suddenly, he had an idea that made him startle:

"The sand can be compressed. Why not use the same procedure with Plutonium?" - he asked himself. In powder form, it must be compressible under the action of a powerful explosive.

The idea seemed interesting. Plutonium masses lower than the critics in dust precipitated violently against

each other, should cause a more powerful explosion than that of the ordinary A bomb. This basic idea is what determined our work.

And in January 1951, in Yucca-Flat, in the Nevada desert, we got the answers to the problems we had posed in our laboratories.

The results of the experience exceeded our hopes. The fractional A bomb, containing the regulatory critical mass divided into four masses lower than the critical, was six times more powerful than the Oppenheimer 1948 and developed a temperature of about two hundred million degrees.

The device loaded with only a fraction of this critical mass, but sharply compressed by ordinary explosives, showed a force equal to the Hiroshima bomb.

Thus, the ideal "match" for the thermonuclear bomb, capable of causing a temperature clearly above one hundred million degrees and the possibility of manufacturing small-sized atomic weapons was obtained simultaneously. Indeed, before these experiences, it was considered that in order to cause a chain reaction it was necessary to collect 12.7 kilograms of active metal.

These 12.7 kilograms were divided into two, three or

four masses less than critical and kept at some distance from each other. The set represented a projectile of a meter in diameter for use.

Thanks to our discovery, it was possible to build projectiles of 12 inches in diameter containing a fractional load of Plutonium barely exceeding 5 kilograms.

Prudence would like children to be banned from playing with sand!

Four months later, the Yucca-Flat explosion first caused the fusion of hydrogen isotopes on earth. But the real experience, the Greenhouse operation, as it was called, took place, in May in Eniwetok.

Eniwetok Atoll, located in the middle of the Pacific Ocean, has for some years become the chosen terrain of atomic experimenters. There was no lack of space. Between the two main islands there were a lot of small islets that looked like white and ocher water lilies laid on the world's bluest sea.

The yellow sand beaches, located on the islets farthest from the center of the atoll, form a kind of circular lagoon that has a diameter of about 40 miles. Deep craters, excavated by successive explosions, gave this landscape a lunar appearance. Each of

these craters marked an important date in the history of the atom and in the development of the war that confronted Robert Oppenheimer and Edward Teller.

The names of the secondary islets, which are difficult to pronounce and practically impossible to remember, were Bokona Arra, Ppara, Mizzin, Baiku, Aomoupuersai, etc. To designate them, we took the custom of the Marine Corps soldiers who, after having conquered them in the bayonet in 1945, were simply called Bok, Mutzi and Aom.

During the preparation of each new test, intense activity reigned over these islets. Gigantic bulldozers leveled the cracked ground to allow experts to accurately measure the depth of the crater that was going to dig the bomb. Special appliances were buried in the ground. They had the mission of calculating the density of the earth and its composition so that it could be determined later what had started the explosion.

Precision instruments were placed at varying distances from the zero point. Connected to the observation center where we were, they had to transmit the first images of the explosion before being sprayed. The human eye is really unable to look and retain images of such a trigger of forces. That is why ultra-fast electronic cameras that record thousands of images per millionths of a second were necessary.

Luckily, these cameras are not moved by the hand of man, because, during an explosion, even the most impassive are good for nothing. The shock seems to occur somewhere inside the brain. Before hearing anything, feeling nothing, the outcome is perceived.

A blinding light passes sharply through the smoked glasses, so dark, that the sun, seen through them, looks like a dead star. The phenomenon is too fast for the image to be transmitted from the eye to the optical center of our gray matter.

When the fireball rises above the horizon, everything is already consummated. There is nothing other than the secondary reaction of the explosion: first the fire of the air caused by the heat and then the steam produced by the combustion of the matter and that rises towards the sky in an immense column of purple smoke.

That March, about ten men were gathered in the seismograph of the University of Berkeley. All were motionless and tense.

The head of the bright luminous needle, green, behind a quadrant, was the only living point in the room. To get from Elugebal, the "chosen" island of Eniwetok Atoll, to the Californian coast, the coup had to take

about a quarter of an hour.

These fifteen minutes seemed horribly long. The wristwatch, on Teller's arm, seemed stopped. We knew nothing, we expected, and yet, on the peaceful night of the Pacific, the immense torch of incandescent smoke had already risen to the sky.

To say something, to break the silence that oppressed us, I turned to Teller and asked:

-Why did you baptize this experience with the name of Mike?

This question also seemed to awaken Frederick de Hoffmann, who was the right arm of the Hungarian sage. Teller smiled. He rubbed his thin, blyach hands for a long time, leaning them against each other.

-It's a story, he said.

The luminous needle of the seismograph always continued on the quadrant.

Teller coughed to clear his voice and continued

-A long time ago, worried and curious to know where the Russians were in their work, I requested an interview with Georg Gamow [Ukrainian-American theoretical physicist and cosmologist]. He had just emigrated to the United States and indicated that the Soviet leaders were following with great interest the activity of our men of science.

While most of the politicians believed that the Communists were a group of illiterate sages, with a century of delay over what has been called after the Atlantic civilization, there had been meetings of Russian, American scientists in Moscow and Leningrad since 1932, Germans and English who, for weeks, had exchanged their views as to a possible disintegration of the atom.

Gamow had participated in these meetings that he considered simply intellectuals and which was not his surprise when, after one of his exhibitions, when he returned to his room, the telephone rang. He picked up and an unknown voice told him that Comrade Nicolás Nucarin begged him to visit him urgently.

Somewhat restless, Gamow immediately went to the interview. After some kind phrases, Bucarin approached, very quickly, the matter. Can or not cause nuclear reactions on the earth? Such was the concern that worried the High Commissioner of the People. Bucarin was willing to put the Leningrad power station at Gamow's disposal for one night so that he could try the necessary experiences.

"He will have at his disposal a considerable source of energy," Bucarin added with a satisfied face, as if he had offered a candy to a child. "However, it will not be

enough," Gamow replied. "I would need millions of volts." And even if all the flammable materials of the earth were gathered, the heat they would give off would be insufficient.

Teller paused and looked at us with this malicious expression he has when it seems to him that his interlocutors do not follow him in the subtle reasoning to which he wants to lead them.

-You wondered where I want to go- he added. But, I was always surprised by the fact that the first politician who has thought that the disintegration of the atom could serve the cause of his country was Bucarín. In Hungarian, Nicolás is called Miklos or Miki. Taking some freedom with english, I have baptized the artifact with the name of Mike.

If Bucarín had not been called by Stalin, he could claim the paternity of the experiment, whose results we expect.

After uttering these words, the luminous point began to falter. He swung wildly from one end of the quadrant to the other. We get up all at once. And we exclaim:

-It's a boy!

This cry of victory was justified. Mike was a complete

success. And Edward Teller triumphed all along the line. Mike had developed an energy of three Megatons (one megaton represents one million tons of T.N.T.).

This power was superior to the total sum of the explosives thrown during the war by all the belligerents, including the bombs of Hiroshima and Nagasaki.

Mike exploded on November 1, 1952. It was an extraordinary event, but it took eighteen months for the man in the street to be fully aware of it. And for that it was necessary an error of our protection services that determined a serious setback. Here is what happened.

I still have, in my papers, the typed note published by the Task Force Commander.

Says the following:

“Operation Castle. March 1, 1954. Eniwetok. Six and twelve seconds. Approximate power of the thermonuclear weapon: seven Megatons. Precautionary measures taken: one hundred fifty-four miles neutralized around the zero point. ”

This should not be enough.

At half past five in the morning, the Japanese fisherman Tadiki Tsutsui decided to launch the anchor

in the waters of the Marshall archipelago. Around him, the ocean was empty. The waves broke with a regular heat over coral reefs. He had verified his position: 11 ° 53' North latitude and 166 ° East longitude.

His ship, the "Fukuryu Maru" (The Lucky Dragon), was 71 miles from Bikini and 165 miles from Eniwetok. The sun would not rise before thirty-nine minutes. The fishing was going to start.

One after another, the crewmen went on deck. The oldest, called Samphiro Masuta, was already preparing the nets when a flash blinded him. He got up and exclaimed:

-Captain, captain, look!

An immense ball of fire, big as the Sun, had emerged from the night. The whole sky was furrowed with red and yellow flames. Then the colors mixed. It could be said that a river of melting steel descended from the sky. Thousands of stars, leaving behind yellow, violet, blue, green tails, literally fell from the sky to the ocean.

There was thunder thunder. The sea seemed strangely shaken, as if punished by this extraordinary phenomenon. A strange movement, slow and heavy, stirred him. A very light blow shook the ship.

-It is the "pikadon" -said the old Samphiro (in Japanese, "pikadon", which means exactly flash and

hammer, was used by the survivors of Hiroshima to designate the A bomb .

Indeed, a huge column of smoke formed at the point where the Pikadon had sunk into the ocean. It seemed to have pierced the sky.

Two hours later, a fine stream of ashes that looked like talc began to fall. Tsutsui felt his eyes burn. The Sun, which in the meantime had risen to the sky, was stained, as if it were covered by a thick cloud of lobsters.

The heat was suffocating. The sailors had the impression of being surrounded by a mass of motionless and heavy air. The skin was sticky, everywhere the white powder had touched.

"Pick up the nets, lift the anchor, start the engine," the captain ordered.

The Fukutyu Maru, with a speed of twelve knots, slowly moved away from its fishing grounds. Two weeks later, exactly on March 14, 1954, Ayaisubhu, its port, a small fishing village at the foot of the Fuji arrived. Apart from the man who stood by the wheel of the helm, the rest of the crew lay along the bridge.

From the morning of May 1, they kept vomiting. His head had swollen almost twice. From their necks,

done, a viscous pus flowed through thousands of tiny wounds. They had blistered hands. His legs did not support them. Even most of them had gone blind.

They were admitted to the hospital specialized in the treatment of burns due to radioactivity.

The Fukuryu Maru was, however, 15 miles outside the area forbidden to navigate. It was more than 85 miles from the place considered dangerous. But what had happened to these sailors amply demonstrated that the men no longer owned the artifact they had invented. Instead of the 7 planned Megatons, the bomb had developed a destructive force of 15 Megatons.

We were wrong by 100 %.

The phenomenon was inexplicable. The most disturbing thing was that the flash of the explosion, instead of lasting 1.2 millionths of a second, had lasted for a minute. No device was able to record the unexpected reactions that had occurred. The electronic cameras installed in the vicinity of the zero point, had been transformed into steam when the unknown forces came into play to maintain the destructive flame.

Our work had hardly raised comments until you found it, but the misfortune of these Japanese fishermen,

victims of the false scientific rigors, triggered a wave of protests that, starting from Japan, spread across the land.

Second part Teller's Victory CHAPTER 4

The Atomic Energy Commission met immediately. He decided to suspend the thermonuclear superbomb test calculated at 15 megatons. Because, if the phenomena that had occurred in the Castle Operation were repeated, the real force of this superbomba would have reached 45 megatines and no one could foresee what would happen then.

Numerous studies have been written about the effects of the H bomb. Very competent scientists have denied that it could cause a worldwide catastrophe. Other men of science, as competent as the first, and based on equal accuracy on the same phenomena, have seen in it, on the contrary, the weapon that would destroy the entire life of our planet.

Who has the reason? The optimists or the pessimists? The question remains posed and I have no intention of answering it. But what seems extremely serious to me is that they can express conflicting views by scientist men whose works have given them true authority. In this, nothing but the proof of a fundamental ignorance, which is superfluous to say that is fearsome.

The scientists of the 1955 atom know perfectly the materials they must use to produce a chain reaction. They know the proportions they need. They can describe and explain the explosion processes without error. But they will ignore what effect their artifact will produce.

They are like those wizards of the Middle Ages who, as a result of a wrong dose, made poison when they had decided to prepare some love elixir.

It is not new. From the beginning of our work we have advanced in the dark. In 1935, Fermi, bombing the Uranium with neutrons, believed to produce a new element: transUranium. Without knowing it, he had been the first to cause fission of the nuclei of Uranium 235.

When, in 1942, we set up the atomic reactor in Hamburg, we feared at the same time that the reactions were not slow enough to prevent the beginning of the explosion, nor fast enough for matter to remain inert.

When, one after another, the Uranium bars were introduced into the Graphite and Cadmium hive, we had no need to look at each other to know that we were pale. Were we going to jump? Or, on the

contrary, if nothing happened, would we be obliged to acknowledge that we were wrong and that our hypostures and calculations were false? Therefore, when the accountants, with an accelerated and equal pace, announced an unbroken chain of reactions, great was the joy that took over us.

We really felt happy to see that we were right and that our calculations were accurate. But above all we were very happy that our equations had not caused a catastrophe of which we would have been the first victims.

Science, without experimentation, would be nothing more than a conception of the spirit. In spite of the electronic robots and the knowledge accumulated during sigles, in spite of the evidences demonstrated by the mathematics, we are unable to foresee. The Latin sentence "errare humanin est" is fundamentally valid for the man of science and, above all, for the atom technician. Because if for the biologist the margin of error is approximately 30%, no percentage can be established for the nuclear physicist.

A biological experience that fails as a result of unforeseen reactions of the organism, probably kills some human guinea pigs, common law convictions, hospital volunteers, mostly morons and socially unrecoverable individuals. But the damage can be

easily located.

In nuclear experience, on the contrary, it is the whole planet, that is, all of humanity, which serves as a guinea pig to the scientist avid to know if they have not made some mistakes in their calculations. Let's go even further. No one can assure that the catastrophe has not already occurred, that we do not pay, within a hundred or two hundred years, the experiences made in both Eniwetok and Siberia.

This is obviously not the opinion of optimists. My friend Konopinski has often shown me, based on number, that the clouds of radioactive dust raised by a thermonuclear explosion a thousand times more powerful than the Hiroshima explosion would not cause much more significant damage than this.

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According to him, a cascade of chain reactions caused by the fission of elements outside the bomb H should not be feared. Certainly he acknowledges that the temperature will be much more important, but will

fall rapidly. In addition, it is intended that the amount of radioactive product capable of poisoning the soil and atmosphere will not be much greater in the explosion of the H bomb, than in that of the A bomb.

Indeed, the fission of Uranium releases a considerable amount of radioactive atoms, while the fusion of hydrogen isotopes only generates helium, a light and harmless gas, which rapidly ascends into the stratosphere.

"It must not be believed," Konopinski continues, "that a bomb a thousand times higher than the one launched in 1945 on Japan, causes a thousand times greater destruction." The A bomb swept everything in a circumference of 5,000 feet in diameter. But a bomb a thousand times stronger than A bomb, could hardly destroy everything inside an area 15 miles in diameter. That is, a thousand times greater power multiplies the results only by ten.

Konopinsky shrugged when I pointed out that the successive discharges we caused could alter the rhythm of nature.

-!Stories! he exclaimed. On average every second there is a lightning centernar due to the storms that explode on the surface of the earth. The energy

developed by these electric charges is at least three times higher than that caused by an H bomb. No illusions. The explosion of its most powerful bomb is not, in the face of natural explosions, more than a raindrop that falls into the sea.

What tranquility of this good Konopinsky! His small brown and mocking eyes, his crushed nose like that of the boxers, his firm chin of a union activist, were famous in nuclear laboratories where Konopinsky mainly attacked those who "dared not go ahead." His mental mechanics were prodigious. Only the mathematician Ulam could face him.

An argument between these two men was, for us, like a wonderful number of varieties. Figures, equations and formulas sprouted from their brains like bullets from a machine gun. In a few minutes, they resolved the most complicated operations and owe the answers, being careful not to forget the possible margin of error of their own calculations.

However, although these careers of flexibility and mental agility gave me some pleasure, I also realized their limits. In Konopinski's enthusiasm there was something that invited him to smile. He said he loved science because this was the domain of rigor and accuracy. But he loved her passionately and there is never rigor or accuracy in the passions.

If he struggled so hard to justify the H bomb (that is, to show that it was not as dangerous as it was intended) it is because there was, somewhere in his subconscious, the feeling that this bomb H would be useful to the cause he defended.

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In the same way that the Oppenheimer group had been obstinate in the realization of the Uranium bomb that had to definitively adjust the accounts to the number one enemy of the humnao genre: Hitler, and, by extension, to Germany, likewise Konopinski worked feverishly to increase as much as possible the power of the H-bomb, because, perhaps without realizing it, I thought that this bomb would be the only weapon capable of destroying the enemy number one of the human race: the Soviet imperialism, and, by extension, Russia and China .

This may explain it. Hitler had attacked with savagery the Jewish communities and Oppenheimer, Lilienthal, etc. etc., were Jewish. Stalin had violently attacked the Polish people and Konopinski was Polish.

Like Konopinski, Teller had also been marked for a lifetime by the communist revolution in Budapest; like him, Nordheim, Von Neumann and Von Hoffmann considered that, in an upcoming conflict, Russia's victory would mean not only the end of the West, but also that of the United States, the last refuge of free men. And they were determined to put everything at stake so that this did not happen.

It is understood, then, that a singular concert of passions was gathered in these laboratories and that it manifested itself in the cold form of scientific research. I realized, with some fear, that I did not belong to either of the two camps.

I have no grudge against the Oppenheimer group for thinking about using the A bomb against Germany, but I understand how he did not see that the danger of a Europe with a Bolshevik leadership was as great as that of a Europe with a socialist national leadership.

On the other hand, I never got excited about Teller and his friends works, who were also mine. The error of the first of the month of March 1954 had produced in me the effect, that an electric shock exerts on a diseased brain. I had woken up. Or, more exactly, another man had woken up in me. I had suddenly realized that the hobby that had dominated my life

since childhood had probably made me a criminal.

Until that time, I had not asked questions about my work. These were justified by their success. I felt happy when I provided a solution to the problems I had been asked to solve. He was unhappy when he had not found the solution sought.

The philosophical systems to which I was constantly referring, although always without realizing it, as is the case with most men, were of a somewhat naive simplicity. It was if you want to use a somewhat worn word, a progressive, that is, that nothing seemed to me greater than the march of the man dedicated to the conquest of his land, deciphering one after another the mysteries that nature had surrounded him; ordering the chaos; simultaneously conquering his universe and his spirit; ceasing to be an animal to become a god.

The development of the story seemed linked to the development of the discovery. When man knew, when he was able to understand everything and create everything, even the mysterious force that put him in the world; when he had no more problems to solve, then he would have reached his fullness, his paradise. And this is why, by contributing my little grain of sand to this progress, I was convinced to advance the moment of this fullness, to bring this paradise closer.

But the further I advanced, the more derisory this vision of the world seemed to me. After the defeat of the German armies and my coming to the United States, I had had time to meditate.

In normal life, a scientist is attached to his microscope as a worker to his tool, we are an office worker at his desk. An adjuster who polishes the vital elements of a car engine rarely reflects on the speed or psychological reasons that men are thrown on the roads in their small four-wheeled houses.

A commercial employee who, for 8 hours each day, answers letters or writes columns of numbers, does not think of large commercial movements that have contributed to giving the modern world the aspect with which we know it. In the same way the atomist technician who, in his laboratory, tries to determine the best components of a nuclear fission, rarely dreams of the consequences of the research he seeks.

But, freeing myself from my laboratory, the Allied victory had transformed the man of science as I was, into a very simple man. And, when I had the satisfaction of resuming my work, all the ideas that I had embraced had not abandoned me. On the contrary, as I progressed, as I saw atomic knowledge progress, it seemed to me that the man of science of

the twentieth century, pretending to discover the truth in the immense building of the universe, was as ridiculous as the nocturnal insect that, lover of light, I would like to hover around the moon.

Because, on this journey he undertakes, the man of science has no foothold, no certainty! It floats like a drowned between two waters, in the immense emptiness of its ignorance.

The few solid bases that could be possessed were destroyed when Einstein showed that matter and energy were nothing more than an aspect other than a whole. According to his theories, it is known that the work of creation is nothing more than a vast dialectic movement: matter becomes energy and energy is transformed into matter, eternally. Einstein has even expressed this definition of the world in an equation:

$$E = m c^2$$

Which means that the energy is equal to the mass of a material particle multiplied by the square of the speed of light.

The laws that Newton had proudly dictated are only valid for our earthly world. Einstein has shown that the rhythm of life in the Universe is that of the speed of light, that is, 300,000 kilometers per second (in a

vacuum). This figure is enough to make us understand why we encounter so many difficulties in addressing these problems. They are not within the human measure of time and life.

The rhythm of a human existence can be given by the pulsations of the heart (75 per second). And this unity may be enough to understand everything when we only deal with human history, with human problems.

But, entering the atomic world, man suddenly participates in a universe for which he was not born, but in which he plays, however, an important role.

For example: Bethe has calculated that within 8 billion years, having the Sun, transformed its hydrogen into Helium, it will have cooled down so much that life will no longer be possible on our planet. ! This catastrophe makes no sense to the normal man. " But he has it for the scientist who, having performed in a laboratory the fusion of hydrogen, that is, the creation of a small portable sun, enters a world whose speed is not 7 beats per second, but 300,000 kilometers per second. It is what happens in our laboratories.

The Sun needs five million years to cause the fusion of the Hydrogen nucleus in Helium. And we have managed to do it in 1.2 millionths of a second.

Undoubtedly, as Bethe has managed to calculate, the Sun consumes 564 tons of Hydrogen per millionth of a second, while, more modestly, Operation Castle was done on about twenty kilograms of lithium mixed with Hydrogen. But while this operation was 28 thousand times less important than what occurs in the Sun, it took place on earth and not 200 million kilometers from our planet!

Normally, the point of the earth furthest from the point of the explosion should have received, for 1.2 million seconds, a quarter of the light and heat that the Sun sends. Which means that 1,000 kilometers from the explosion, the temperature should have been six times higher than in Ecuador. Do not smile! When it was decided to begin the experience, no one could assure that this would not happen.

For once, the calculations we had made on the protective effect of the inertia of matter have proved accurate. Heat, contrary to the resistance of the air, rose rapidly to the less dense layers of the atmosphere.

-"Come, there is nothing to fear," said the good Konopinsky.

-"It is true!

Because the phenomenon is tiny and gigantic at the same time. It is tiny when compared to solar

phenomena: to match it it would take 10 million H bombs per second to explode. Our planet would then cease to be inhabited, because the temperature would exceed 20 million degrees. But it is gigantic when compared to the sources of naturally active radiation from the earth.

We know that it takes millions of years for Uranium I (238), atomic number 92, to become Radio II (atomic number 88). During these millions of years, Uranium naturally transforms into Uranium X, Uranium Z, Uranium II, and ionium. Converted to Radio, it is preserved in this form for 1,580 years. Then, in four days, its atomic number changes. From 88 it drops to 82. Finally 22 years later, it has lost all its radioactivity: it has been transformed into Lead.

These atomic destructions of matter remain a mystery to us. Nature has its alchemy and we have not yet deciphered its secret. However, it is possible that certain plant and animal life has corresponded to a certain radioactivity present on our globe.

Thus it is possible that, during the geological era, giant animals could not resist more than thanks to a more intense radioactivity that allowed their cells to develop normally. Thus it is plausible that the appearance of man is a direct consequence of radioactivity and that his disappearance may be linked

to the variations of this radioactivity.

The severity of the problem is understood. The human being has appeared at a certain stage of evolution that was conducive to him and his destiny is to disappear when the environment has made it hostile. Therefore, to what extent is it permissible to intervene in the extremely slow process of nature? Is there a right to cause a break in balance without which human life on earth would not be possible? To what extent and in what proportion can we use radioactivity are causing our self-destruction?

Because it is too often forgotten that the radioactivity dispersed by a single thermonuclear explosion represents about 900,000 tons of Radio. Since the total amount of Radio that exists on our globe is two kilograms, a single atomic experience causes, therefore, a radioactivity 45 million times higher than natural radioactivity.

Consequently, the consequences of an atomic explosion could have very serious and very damaging unforeseen repercussions for "everything" that constitutes nature. But H bomb has been overcome, it is already outdated.

I have spoken, at the beginning of this book, that June morning when my son played in the garden when the

phone rang and Billa Ramon, my assistant, exclaimed once more:

-It's a boy!

He had spent the whole night working with several colleagues to give the final touches to a new explosive whose power makes him smile when talking about the H bomb. It is about the C bomb, or Cobalt bomb.

Between the bomb H and the bomb C, the terrible alphabet of the atomic laboratories, another letter has already emerged, the letter U, a new U bomb, which designates the Uranium bomb.

Uranium or Plutonium serve as a match to this new device. The great innovation of the U bomb is that the bait, instead of being surrounded by steel, is enclosed in a shell of raw Uranium 238.

In nature, we have just seen, this element manifests only a very weak radioactivity. It needs millions of years to transform into Radio. But, at a temperature of several hundreds of millions of degrees, this transformation is verified in a fraction of a second and the radioactivity of millions of tons of Radio is immediately transmitted to the environment.

The discovery of the U bomb has already begun to modify the atomic military strategy. It is possible to

imagine today that an enemy, exploding a certain number of U bombs in a desert place in the Pacific, can sow death throughout the entire United States and Canada.

Five or six days after the explosion, immense radioactive clouds, pushed by the constant winds that, in these regions, go from east to west, following the earth's rotation movement, would reach the coasts of California and slowly move towards the inside.

As they cooled, radioactive dusts would fall on the ground. Every living being not provided with a protective breathing mask would be condemned to a certain death or at least atrocious burns as a result of which it would become sterile.

At the same time that he began to modify the ideas that were had about the war of the future, the U bomb, gave birth to a new method of releasing nuclear energy: thermofission.

The chain reaction of a heavy element, considered stable, has been proven possible with the condition that it be brought to a temperature of several hundred million degrees. The hypotheses of reputed technicians are radically confirmed.

That was when we started talking about the Cobalt 60

bomb. The radioactivity of this isotope of Cobalt 59 is far superior to that of all the elements. For five years it emits very penetrating gamma rays. Some grams of Cobalt 60 have a radioactivity greater than the two kilograms of Radium that exist on earth.

A dozen kilograms of Cobalt 60, surrounding the "match" of Plutonium, could transmit over a radius of several thousand kilometers, a radioactivity that no living being would be able to bear.

Faced with this new discovery, the only hope of salvation lies in the fact that the consequences of a bomb C explosion could not be foreseen by whoever was the first to use it. Launched anywhere in the Pacific or Siberia, the C bomb would give rise to clouds that, dragged by the wind, would sow death on the whim of luck, both in Africa, in Australia, and in Europe.

But let's not sing victory so soon. There are means of defense against radioactivity. Protected by a mask and waterproof clothing, men can withstand a dose of radioactive radiation that normally, without protections, should be fatal, especially if they have previously received sugar injections.

Therefore, it is possible for a State, having provided its own population with protective armor, to explode a

C bomb, in order to destroy the citizens of other countries not prepared for aggression.

The surprise would play an important role. Millions and millions of human beings would die before the authorities had been able to take defense measures. Compared to the effects of the C-bomb, the H-bomb would be, even if it exploded in the heart of a big city like New York, a small-caliber weapon.

But we would make a serious mistake limiting the dangers of a nuclear explosion only to radioactivity. This explosion also causes series chemical disorders in nature. Under the influence of high temperature, nitrogen and oxygen give rise to a large amount of nitric acid (a single H bomb is enough to constitute several million tons).

Soluble in water, nitric acid falls with rain and can burn the vegetation of an entire country. Certainly, the electrical discharges of storms also form (approximately) about one billion tons of nitric acid per year. As for natural radioactivity, this dose is bearable and even necessary for the chemical balance of vegetables.

But at what time, artificially increasing it, is there a risk of destroying the vegetation of the earth? It is ignored. And we will not know more than by way of

experiences. In a laboratory, it is impossible to define the line of separation between life and death. Once we have killed, it is possible that we know where this border is: but it is too late to give life to those that have been suppressed.

There are other chemical consequences of nuclear experiences: carbon production 14 in large numbers. Bethe had shown it magnificently. But he had not said that this isotope, necessary in small quantities for plant and animal life, kills when it is in massive doses.

Carbon 14 is preserved for 5,600 years. Each explosion greatly increases its proportion in the atmosphere, and so the following question can now be asked:

When the air, overloaded with carbon 14, will become irrespirable?

It is understood where my reflections have led me. I am far from the certainties of my youth. I no longer think that scientific discovery helps man to get out of his night and to know peace and joy.

We have discovered the means of suppressing, not only human lives, but the very principle of life. This is an extremely serious thing, although a good number of my colleagues do not pay attention to it, in my opinion, and accuse me of displaced sensitivity when I try, very timidly, to put them on guard against freedom

from a force that, one day, I could crush them.

Second part Teller's Victory CHAPTER 5

Almost every night, Bill Ramon and Wilhelm Hartmann, my old friend from Innsbruck, meet me in my office. And, almost every night, the conversation revolves on the same topics: the ones I expose here. They adopted anti-me the attitude of adults who want to show benevolence to a tormented teenager.

One night, Hartmann left, however, his smile a little higher and, with an excited voice, with a voice that whistled something, he exclaimed.

-I don't understand you, Erwin. You are in the profession from the beginning. Like me, you know how the matter was when Hitler brought us together. At all costs it was necessary to manufacture the A bomb, before the Americans.

We got it, but too late.

However, you forget that the bomb has helped us save hundreds of thousands of soldiers.

-How? I asked, surprised.

It was an issue that I had never addressed since my arrival in Los Alamos, where I had the revelation that it was the Innsbruck bombs that had contributed to the definitive defeat of Japan.

Hartmann found himself on his shoulders and continued:

- Let's see, you will know well that, it was only offering our 5 small primitive A bombs from Innsbruck to the Americans, as Jodl managed to convince Eisenhower that the capitulation, on the Western Front, entered into force on May 7, at midnight, forty hours before the Eastern Front. In this way, hundreds of thousands of men were able to surrender to the Anglo-Saxons, instead of being captured by the Russians. Did you ignore it?

-Yes -I answered.

Bill and Hartmann looked at each other, surprised. For them all that was already old.

My old Innsbruck companion was not a physicist. His role, in laboratories in Germany, was to monitor our work. I knew that he was at the service of the Americans since the capitulation of the Reich, but I did not know to what extent he had become his trusted man.

"Now you will see how the machine works in the United States," he continued, full of admiration. Two days after the arrival of the specialists in Innsbruck, everything was already organized for transport. The pieces of the laboratory, disassembled and numbered, were sent by truck, via Genova in Italy, to be shipped

on "Liberty" ships.

For the transport of bombs A in separate pieces, we had at our disposal as many B.29 as we wish. It was a true army of airplanes and ships that crossed the Atlantic in this way, loaded with the most precious spoils of war.

The meeting of the constituent parts of the bomb had been set for July 12 in Alamogordo. At two in the morning, everything was already gathered in its place. Nothing was missing. Neither the technicians, nor the assembly workshops. Even the smallest screw, everything had been planned. Work began immediately, and on July 16, 1945, at dawn, Hitler's secret weapon mushroom rose in the sky of the United States. *[Alamogordo Trinity Test?]*

Hartmann, in his enthusiasm for Order and Organization, had become, as much of the Germans in the United States, more American than the Americans themselves. The day after the smoke and tumult of the Weimer Republic, national socialism had seduced him with his promises of effectiveness. But, compared to the dynamism of the New World man, our German effectiveness was very little. While we build a house, Americans with their means, build a city.

-And you want him to stop now! I do not know in the name of what humanitarian theory! As if the Russians were not in a position to make weapons that seem so horrifying! -he added.

Nothing could answer this argument. Hartmann was not mistaken. The world power that was allowed to advance in its nuclear career, would sign its death sentence. I knew that. In the same way that it had been necessary to defeat the adversary in the construction of the A bomb, it was now essential to be the first to manufacture the H bomb, the U bomb or develop the Cobalt bomb.

Dominated by fear, it was necessary to go quickly, one after the other, to the different stages, accepting the danger of a hypothetical death in order to avoid the dangers of a certain death. Like it or not, the man of science is imprisoned and chained in the gear of politics.

"To save the world, all atomists should refuse to work," I said.

-Oh! Beautiful slogan:! Atomists from all over the world, unite! said Hartmannn laughing. But forgive me! Although you are able to solve an equation with 20 unknowns, you are no less than the workers. Skilled worker, no doubt, but nothing more. Let the political

men take care of the international affairs.

Do you think that Einstein's calls have penetrated Russian laboratories, and that Gustav Hertz, Kapitza, Pontecorvo's have decided to strike the atom?

!Moonshine! Instead of having illusions in this regard, it is preferable to prepare for any eventuality. If you want to survive a nuclear war, it is necessary to take from now on the measures that are imposed. It is up to you, the men of science, to open the eyes of the public about the dangers that threaten you so that you agree to collaborate with us.

! Unfortunately it is not so! Even industries try to resist and only proceed with disgust at the dispersion of factories.

Hartmann worked, since he became a US citizen, under the orders of General Ferguson for the organization of the Passive Defense of the North American territory. In Germany, he always had the word "Schlagkraft", shock force. Today is dreamy is the dispersion. If everything depended on him, he would demolish New York and Chicago to spread them, scratch him by scratch him, especially the territory.

In his opinion, every urban agglomeration of more than ten square kilometers has become an intolerable absurdity. It constitutes a potential target for weapons,

atomic enemies. Passive Defense demands the disintegration of these human agglomerations.

- "It would be necessary, at least," Hartmann said. "Distribute the population over the territory if you don't want to build underground cities." It is enough to bury under a meter of earth to protect against the most powerful H bomb, with the condition of being 5,000 feet from the point of the explosion. So why not bury the essential industries of the nation in peacetime?

- But, where would the money needed for this gigantic transformation come from? asked Bill Ramon. (My assistant, although Mexican mestizo, was endowed with the practical sense that all North Americans possess.) Don't forget that industrial dispersion already costs taxpayers ten billion dollars per year. To create underground cities, we would need hundreds of billions, more important than those spent in the course of World War II.

"Good preventive medicine is never quite expensive," Hartmann interrupted. One hundred H bombs dropped on the main American industrial centers, can not only paralyze our activity, but also cause damages greater than the total value of our means of production.

- And human beings, what do you do with them? I asked.

"Well," Hartmann replied, "you try to disperse them." Even if they don't want to! Each inhabitant of a large city should have a second home, which they would occupy in case of war. Not only New York, Los Angeles, Chicago, San Francisco or Boston, but also all other urban centers, should be evacuated within 24 hours.

In this case, Russian bombs would fall on deserted cities. Men should understand that if they stay by their house and their family objects, they succeed. During the last World War, the probability of surviving a bombing was nine against ten in the great German cities. With nuclear explosives from now on there will be nine odds against ten to die.

-And about radioactivity, what do you say? My question had the gift of irritating Hartmann.

-!Bah! he exclaimed. Almost every American family finds money to buy a \$ 3,000 car. The complete anti-radioactive equipment, mask, glasses and waterproof suit, does not cost more than 400 dollars. Everyone who wants it can buy it to measure.

There was no trace of humor, irony a bit bitter in his voice. I did not need to close my eyes to see the ideal society that my countryman imagined.

An alarm radio receiver would constantly work to put citizens on guard against a surprise attack. These would constantly carry with them the necessary equipment for the case of alarm, as we had worn the mask against asphyxiating gases at the beginning of the last World War.

One part of the population would work in underground factories, while the other would be willing to escape to a place chosen beforehand.

When the surveillance receiver announced: "Attention, attention, intercontinental rocket in the stratosphere", the operation "dispersion" would begin. The enemy would thus be deprived of the effect of surprise and our reprisals could fall on their cities.

-And Europe, with its population density, caught between two fires ... what would become of it?

"Europe is lost," Hartmann said coldly. Only countries like Russia or the United States, which have an extensive space at their disposal, can survive an atomic war.

The agglomeration of 50 million inhabitants on the three hundred thousand square kilometers of today represent Germany, or the 50 million English people piled up on their narrow islands like a corridor, suits these countries in defenseless. They constituted a

force at the time when the concentration of the media in a small space was a source of power.

However, already during the Second World War, it has been seen that Germany and England, because of this same state of affairs, were vulnerable powers. In spite of everything, to bring the Third Reich to his knees, it was necessary, in 1944, to spread them with four hundred thousand tons of T.N.T.

But you well know that a single H bomb represents eight hundred thousand tons of T.N.T. Draw the conclusion yourself. Europe has not been built in anticipation of the nuclear age. It will disappear like old Atlantis. We can congratulate ourselves to be among the escapees.

As I spoke, Hartmann kept fixing his blue gaze, which shone, fixed, behind his frameless lenses. Something like a smile finally twisted his thin lips:

- Ah, these wise! -sigh. They are always in the clouds. They have created the atomic age, but now they are unable to adapt to it.

Then, addressing Bill, he added:

-However, most Europeans are not in a position to understand what will come to them. They show an air of realists when they talk about philosophy and

politics, but in practical life, that is, deep down, in politics, they are sentimental, sentimental, incorrigible.

Let's see, for example, the German press. It is full of: "Ah! Let's not forget the wonders of the past!" However, the German cities rebuilt since 1948 are really more comfortable than those before the war. Without the sweep carried out by the American bombs, our compatriots would continue to live in their old respectable, wonderful and unhealthy "secular houses."

Without the war, they would never have had the courage to touch the historic neighborhoods of Nuremberg or Munich, when it would really be necessary to destroy everything, cathedrals, caves, museums, all these vestiges of a past, past so that Europeans finally wake up and They understood that we are in the twentieth century and that, with reinforced cement, things can be done ten thousand times better than with the stone, provided that there is no sacrosanct respect for the mossy patina of spent granite ... But no we will never make him understand it - he added getting up to say goodbye.

His mocking tone prevented any response. Bill offered to drive him to the San Francisco airport. They asked me if I wanted to accompany them. The night was quiet. I had no justified reason to reject the proposal

without giving the impression of feeling annoyed at the attitude of my two guests.

When the four-engine of the T.W.A. Leaving the takeoff runway taking Hartmann, I invited Bill Ramon to have a glass at the airport bar. Bill ordered Coca-Cola and I a beer. The waiter opened the bottle that contained it before me. Before, in Germany, there were huge breweries that took out beer from giant barrels. Do they still exist? They ate sausages. It was sung. The beer was famous. There was not much comfort, but it was very nice.

While this beer tasted like iron and this varnished bar looked like a clinic. I must be the only one who felt that way. A quack crowd crowded around the tables. Rich from New York, come to spend the first days of spring in California, so as not to pile up on the beaches of Florida, they waited for the departure of the planes that had to return them to their homes.

In the middle of the general murmur, Bill wanted to tell me something. I did not hear anything. He took me by the arm and shouted in my ear:

-Boss, what can these people talk about if they ignore everything, and even the existence of the proton?

I looked at Bill in amazement. He didn't like the little things in the world. It was scary. I found the pretext of

an assignment and left it, I left. I needed to find myself alone. !Caramba! The day the world belonged to scientists, it would not be worth living ...

Second part Teller's Victory CHAPTER 6

Conversations with my colleagues had at least one advantage. They showed me that my attitude could be satisfactory to the spirit: it had no significance. We lived in a closed world in which I had no influence and I was disgusted - even if I had the talent and courage - to set up the debate in the forum.

The politicians needed to be persuaded. The difficulties that a personality like Teller had to overcome to influence them and the next chapter will show that this was also an illusion.

On the other hand, our isolation from the rest of the world was not only intellectual, as one might think, after these words of Bill Ramon that I just transcribed. It was also material. Indeed, the Atomic Energy Commission had defined two basic principles, two postulates, which were to determine the choice of location of nuclear factories.

1 ° An atomic laboratory is a primary objective for an eventual enemy. It will probably be bombed. Consequently, it should not be built in the vicinity of a

large urban agglomeration.

2 ° The facilities of an atomic laboratory extend over tens of thousands of hectares. It is advisable to build them on poor land so as not to deprive agriculture of productive land.

This is why the atomic cities in which we are condemned to live rise in deserted regions and are built on the sand. Around us, the vegetation is arid. Like lepers, we are separated from our neighbor who, without "safe conduct", has no right to venture into entrenched fields dominated by the atom.

However, from time to time, the outside world sends us emissaries. They are statesmen who must include the bomb in their political calculations, or generals that prepare their strategic plans based on the power of the new explosives. Both are considered realistic. However, we are almost always asked questions of touching simplicity.

For example, in early September 1954, we were summoned to participate in an interview in which Cabot Lodge, representative of the United States in the UN, took part.

Cabot Lodge, President Eisenhower's personal friend, had come to learn about the technical possibilities of

establishing international control of nuclear energy. Young, elegant and attractive, he had a face with regular features, a sweet voice and a funny gesture. It looked more like a salon gallant than the politicians I had met in Germany.

These, as if they wanted to convince themselves of their own authority, interpreted each and every one the comedy of force and intransigence, synonymous with resolution and determination. Cabot Lodge, on the contrary, admitted all opinions in principle, respected all characters. His benevolent attitude encouraged and made the conversation pleasant.

"You know more than me," he said by way of preamble; but I know, however, that the raw material of atomic weapons is Uranium. To control the atomic activity of each country, would it be enough to control the mines from which this metal is extracted?

"Undoubtedly," Teller replied. But how do you plan to establish this control?

-It's you who should tell me.

The word was then granted to Warren Smith, our geologist, who is as wise as a library, but of a more deadly boredom than the explosion of the H bomb (at point zero). In a monotonous voice, Warren Smith immediately gave proof of his knowledge:

-Uranium prospecting has begun with the atomic era. Before the war, this metal was used only in small quantities for ceramic coloring. But it had already been discovered in numerous regions of the globe. There are very rich deposits in the Belgian Congo, in the Joachimstahl region, in Bohemia.

It is probably found in large numbers in western France, around Bagnoles -de-l'Orne. The Russians extract it in Saxony and in the Erzgebirge mountains, which separate Czechoslovakia from the North American zone of Germany. There are supposed to be considerable quantities in Ukraine and the Caucasus, as well as in the Carpathians. Several important deposits have been discovered in the North American and Candienses territories: on the Colorado plateau and in the Rocky Mountains, in Utah, in New Mexico and in Arizona.

Warren Smith took a breath and continued:

-At the beginning, the prospect was done with the help of Geiger counter. The geologists, equipped with this device, crossed the desert regions on foot to order excavations where the ground emitted gamma rays.

These rays are barely noticeable when the ore is buried more than 150 feet underground. Since the invention of the scintillator (device more sensitive than

the Geiger counter) it is now possible to discover the deposits that are at a depth of 300 to 500 feet.

Luck has greatly helped the work of geologists. Often, after several weeks of fruitless searches in regions where the soil was likely to contain precious metal, they found Uranium where they least expected it. Since 1949, millions of kilometers have been traveled in North America alone to discover a small part of the Uranium, buried in our subsoil.

According to realistic calculations, the raw material of nuclear weapons would be found on the surface of the earth's crust in an amount that would be a thousand times greater than that of gold, one hundred times greater than that of silver, ten and fifteen times more important than of zinc and tin. Uranium would constitute 1 / 250,000 of the matter. Even the socket of the statue of Jorge Washington would contain a few kilograms.

Cabot Lodge listened carefully to the exhibition of the expert.

-According to you, how many geologists would it take to explore the riches in Uranium of our planet?

-In how much time?

- Assume five years.

-It is impossible.

-Nothing is impossible when you want to ensure the future of humanity -declared the representative of the United States in the O.N.U.

The geologist shrugged:

-Then mobilize two million geologists, if there are two million in the world. Provide them with meters and, in five years, on condition that they work sixteen hours a day, and that they have airplanes and jeeps at their disposal, and that the different governments of the countries visited allow them to move at their leisure, they will discover most of the deposits found on the surface.

As for the unusable sites because of their depth, such as those in Tennessee, West Virginia, Ohio, Indiana and Alabama, it would take about a century to discover them all.

"Therefore," interrupted Cabot Lodge, "according to you, you should not start with Uranium if you want to establish international control of nuclear energy, but rather by monitoring the industries."

"This seems easier to me," said Warren Smith.

-What is your opinion, Teller?

Our chief was aware of the visit of the government representative and his objective. He had prepared a

detailed report for the occasion. Calmly, he pulled it out of his wallet and began to read:

-An effective atom control would require the constant monitoring of a 200,000 industrial companies and, consequently, the appointment of as many technically qualified inspectors.

But it is unlikely that all these inspectors are politically "safe" and morally incorruptible. Therefore, an inspector control body would have to be created.

"But let's see, Teller," said Cabod Lodge, "do you think there are 200,000 companies in the world that work for nuclear energy?"

-Of course not, but I include in my calculation the companies that have facilities that could work in it. Naturally, it is not just "atomic batteries" [today we call them nuclear reactors]. They can be assembled quickly, with the condition of pre-preparing the pieces separately.

You should know that Fermi's first reactor was improvised on a Chicago tennis court. It is enough to have a reserve of raw Uranium and an important source of electrical energy to start everything up within a week.

Therefore, the dismantling of the atomic industries

that currently exist means nothing, if you can continue to prepare in the tractor or automobile factories the parts that could be assembled after the easiest way in the world. That is why it is necessary to be able to control the industrial infrastructure of a country to be certain that it is not preparing for atomic warfare.

"Go on," Cabot Lodge said dryly.

-While a greater number of 200,000 inspectors, qualified technicians, it is doubtful that they can currently be found.

On the other hand, to prevent a government from building atomic factories in sparsely populated regions, it would be necessary to constantly carry out aerial surveys of an area of about 50 million square kilometers.

About fifteen thousand devices are needed for this aerial survey - if you can rely on the surveillance of a 1,500 kilometer diameter space per plane. Exits should be at least bi-monthly, in order to prevent tunnels in the mountains, such as the one built by the Germans in Innsbruck.

Therefore, it is necessary to have 390,000 departures and a staff of at least one million men. Flights should be carried out at low altitude, in order to be able to photograph and interpret all suspicious movements.

"You exaggerate," interrupted Cabot Lodge. Teller stopped reading. With a gentle gesture he lifted his presbyopia glasses.

"Do you think," he said, "that if the Russians decide to build an atomic factory somewhere in the Urals or in the Caucasus, will the precautions just enumerated to prohibit it be sufficient?" Suppose they only work at night or use an alarm system to warn workers of the approach of a U.N. plane. What could be seen in the photographs taken in the course of reconnaissance flights?

"Control, as you conceive it, is impossible," said the government delegate. No power, and especially the Soviet Union, would ever tolerate that its territory was recognized by foreign airplanes and that international inspectors supervised its industrial production.

Engaging in such academic discussions would really waste time. But you yourself said, before the test of the H bomb, that to know if it would work out or not, it was first necessary to test it.

No doubt this is also valid for Russians. Consequently, if they continue to manufacture bombs they will be required to carry out tests. In this way we would realize immediately, as in 1949, when the "Joe One"

bomb exploded. With this fact the violation of the commitment made with respect to atomic weapons would become evident.

- Unless they chose New York or Washington as a test ground!

Cabot Lodge avoided the observation with an impatient gesture.

-This can also happen without international control. That would mean war. But we could warn you that an experience anywhere in Siberia would be considered by us as an aggression. Naturally, if they want war, nobody can stop them from declaring it. I believe, however ...

"I'm going to tell you something," Teller interrupted. Experimental explosions are no longer necessary in the current state of atomic progress. It is preferable to do them, but you can do without them and calculate, according to the temperature developed by an element in a reactor, what will be the temperature at the time of the explosion.

Probably the Russians use this method. That is why his experiments are less frequent than ours. They simply place all trust in their men of science. We, on the contrary, are forced to explode each new weapon.

Otherwise, I know in Los Alamos and Princetown some who would go immediately to the Pentagon and the Senate to claim that they are worthless. And they would not lack ears that would listen to them pleased.

"Therefore, according to you, there would be no practical means of establishing effective atomic control," observed Cabot Lodge, who did not realize the allusion directed against Robert Oppenheimer.

-Yes. Such control will be achievable on the day when there is only one winner and one defeated on the earth.

It was the first time that, publicly, Teller alluded to a world government, the only solution to the atomic mess. It shouldn't be the last.

Second part Teller's Victory CHAPTER 7

The political and military government began to take interest in me, shortly after this visit of Cabot Lodge. Two aviation generals and a civilian character with a congested face, subjected me to a real interrogation that began with this leitmotiv.

-According to you, how long would the German technicians have needed to build the V-3?

This question made me return to Peenemunde.

In the United States, similar interrogations are frequent. They are called "Hearings" (audience). These hearings are organized every time an important decision must be made. Researchers, similar to those of the statistical services or those of Dr. Kinsley - with the difference, however, that they are very important political figures: influential members of the Senate, Pentagon officials, etc. - wander around the country.

They collect all the testimonies that they find interesting, they study the exposition of the problem and, finally, when they have taken a personal opinion, they propose a political solution to the politicians of Washington and the military of the Eisenhower government.

In the citation letter there was a written word. "Witness". In favor of whom or against whom should I testify? The note did not set.

The jury was chaired by General Curtis Le May, head of the Strategic Air Command. Chubby, with his gaze alive, seemed rather to devour his cigar than to smoke. I didn't ask questions of any kind. Occasionally, he grumbled:

-That's important (This is important).

His Air Force comrades called him "direct to the target" or "the general 10%." They had put these bikes after their raid on Saint-Nazaire. Curtis Le May had wanted to demonstrate, at the head of a bombing squad, how a mass aerial action should be carried out.

On that date he was only 36 years old, but he already had the stars of general.

"50% of our bombs fail their targets because the pilots, under the fire of the enemy anti-aircraft artillery, fly in zig-zag," he intended.

-It is the only reasonable way to carry out an action, if you want to avoid the destruction of devices and save the crews -answered the experts of the Royal British Air Forces.

Le May considered the entire theoretical discussion useless. With a group of volunteer pilots, he took off for an "experimental mission." The objective was Saint-Nazaire, the main base of German submarines in France.

He was received by a nourished fire from the D.C.A. In spite of his concentrated fires, he advanced between the explosions of the projectiles, straight to the target. Back at his base, he took stock; Ten percent losses. It was twice the usual proportion.

General Curtis Le May then made the following calculation:

-Our factories produce every month a number of aircraft equivalent to 30% of our air fleet. Our schools prepare a number of pilots every month equivalent to 20% of what we already own. Therefore, it is possible to double the losses in crew and material.

And the next day he gave the following order: "No evasive action will be tolerated. It is necessary to advance directly to the objective.

Moved to the Pacific front, he made the command of 300 B-29 bombers, according to the same principle, the first giant raid on Japan.

Ten years later, he had not changed his conception.

"He will only accept to give atomic bombs to tactical aviation when the Soviet Union is already three times destroyed," said his opponents.

The strategic use or tactical use of nuclear weapons had, in effect, become the main reason for discussion of the Pentagon. In short, it was as follows: among American strategists, some claimed that mass reprisals would be the only possible response to a Russian attack.

And that it would even be better to prevent this attack by being the first to declare war. To prevent Soviet bombers from launching the "Malenkov one" (bomb H) over the cities of the United States, it would be necessary, they said, to destroy them at their starting bases.

Others, on the other hand, argued that for fear of reciprocally destroying themselves, the powers would probably give up strategic bombardment and only use their atomic weapons "tactically" on the battlefield.

The two sides fought a fierce battle when, in 1954, they allied themselves suddenly against a new conception, a common enemy, if it can be said. This new conception, this common enemy, was called an intercontinental rocket.

The alarm was given by G.P. Sutton, expert of the North-American Aviation Company. According to him, the Strategic Air Command of the Soviet Union, as the Americans call the A.D.D. (Aviatsive Dalneve Devstiva) Soviet, would have built a rocket five times more powerful than the German V-2.

The Pentagon immediately proceeded to an investigation. The file opened on this occasion was called "Operation Peenemunde". The central character of the process was my compatriot Wernher von Braun, builder of German "V" weapons.

At the end of the war, when I was transferred to the Baltic Sea base, 10,000 "V" type rockets had already left the underground factory. Around 4,000 had been launched against the Allied positions, of which half had crossed the English Channel, and 1,230 had exploded on the perimeter of London.

The characteristics of this weapon were the following: 50 feet high, by 5 feet in diameter, speed 5,500 kilometers per hour, range of 1,000 kilometers.

-How many people worked in Peenemunde? asked General Pete Quesada [Elwood Richard Quesada], Teller's great friend and protector and the second soldier of my examining tribunal.

-There were about 6,000 workers and 1,200 technicians.

-What has been done about them? This time I was questioned by James Killian, president of the Lincoln Laboratories in Massachusetts, in which the reddish color of his face, became purple as the hearing continued.

-A hundred, work with Werner von Braun, in Redstone (Alabama).

-Well, we already know, but what about the others?

-I hope they have not been deported to Russia, I hope they are in Germany.

-With regard to technicians, in the Federal Republic we have found about fifty of those who worked before in Peenemunde. 67 confirmed deaths are added to this list. By the way, you are on the list of the dead in your home country.

This news, unimportant in itself, made a strange impression on me. It allowed me to understand how secretly the American and Russian services had carried out the hunt for the technicians after Hitler's defeat.

He finally had the official explanation of Ida's search for American services. The explanation was simple.

He had wanted to separate her from his countrymen. Prevent me from having relationships, talk, tell what had happened to me.

After being called and hired by the occupation authorities in Frankfurt, she had been housed in a property requisitioned by the Americans and guarded by the military police. She made her meals in the canteen. He had been "deterred" from all contact with the native population. He had even been told that it was better, for me, not to indicate to anyone my presence in the United States.

- Who was, according to you, after Braun, the best qualified technician of Peenemunde? Killian added.

-Friedrich Wagner.

-Where is?

He left Peenemunde at the same time as me, with the intention of moving to Karlsruhe.

It was taken prisoner by us. In 1946, he had come to the United States. But on the eve of his departure, a car with an officer and two soldiers in American uniform, went to look for him. He said there was countermanded, and his plane was leaving immediately.

Wagner was under the protection of two noncommissioned officers of the Military Police, in a town in Stuttgart. The morons, without checking the

documents of the officers, let Wagner go. Then he disappeared. probably it was a coup organized by the russian N.K.V.D.

General Quesada gave me these explanations with a disappointed tone. Then, as if I wanted to forget these past mistakes, he asked me:

-Let's go back to this intercontinental rocket.

At what point were his works in Peenemunde?

- "That's important" - General Curtis Le May did.

-According to our calculations, it should be finished in autumn 1945.

- Wernher von Braun says the same! - Quesada exclaimed raising her arms as if to invoke heaven. Why wouldn't the Russians have it in 1955?

"According to you," Killian said, "were the calculations they speak correct?"

-Yes.

- Would you have entrusted the bomb A to a similar rocket, or rather to a bomber?

- "That's important" - Curtis Le May murmured again.

-I was transferred to Peenemunde to study this matter. The war ended before I could submit my report. I was determined to pronounce myself in favor of the V-3 (intercontinental rocket). Since its margin of error of 1% over a radius of action of 5,000 miles (8,000

kilometers) could cause it to divert only 80 kilometers from its target.

-This margin of error could be reduced to 0.2 % affirms von Braun, and the radius of action of the rocket would be increased up to 10,000 kilometers. It will then fall, in the worst case, 20 kilometers from its target. This detour cases of importance with the H and U bombs.

Quesada had spoken like a judge who pronounces his verdict. Curtis Le May kept chewing his cigar. His eyes were staring at me, but I had the impression that he did not see me. There was a minute of silence.

-"That's all" - he said sharply.

I was authorized to leave.

In the lobby of the Pentagon, Teller was waiting for me walking impatiently. He had wanted to accompany me on the occasion of my first visit to Washington. But he had kept secret about the object of my citation.

-Everything went well? -He ask.

-Sincerely, I ignore it. I have not understood anything.

-I will explain everything now that you have become a character the "Brain Trust" consults, he said, taking me by the arm.

We followed the main promenade, lined with giant

trees that leads to the Capitol.

-In America, on average it takes three years to make any decision. Currently the fight is fought between three strategic conceptions. Each of the jurors who have questioned you, belongs to a different group. General Curtis Le May is a supporter of the defense by offensive. When he saw me for the first time he said:

"Give me bombs in large numbers, more and more powerful bombs, and then get out of my way: I will fly to Moscow."

Its great merit is to have reorganized the Air Forces. After the explosion of "Joe One" (June 1949, in the Soviet Tundra) he was appointed Strategic Commander. At the same time he became the sole owner of the nuclear bomb. Established a permanent alarm system. In North Africa, in Great Britain, in the Middle East, in Japan, and even in Greenland, we have airmen who are constantly on the alert.

It is enough that the general press a red button of his office, so that in a second the "Operation Vista" is automatically initiated. As many as 400 Boeing B-47 Stratojet bombers, loaded with H and U bombs, would simultaneously take off from 30 strategic bases currently in service.

Nothing could make them go back. Pilots have the slogan of not obeying any radio-transmitted counter order. Indeed, it could be that the enemy, having managed to take over our secret transmission code, tried to radiate on the same wavelength to cancel the attack.

Be sure that Le May will not hesitate for a moment to press his "D" button. All you will feel is not being the first to drop the bomb on the Kremlin.

Teller paused for a moment and cast suspicious glances around him on the right and left. Then he took me by the arm and said, speeding up:

-In the present moment, general Le May has great difficulties with his colleagues. The Navy has taken the initiative. Admirals claim that the Russians know the location of the starting bases of Operation Vista. But that will be the first to be destroyed, in case of war, before General Le May has been able to press his button, Soviet aviation should logically destroy our organization of reprisals.

-Therefore, the admirals ask that the bombs be entrusted to the Navy. Aircraft carriers should, according to them, serve as a take-off runway for large-range firefighters. Indeed, the enemy is not in a position to know at what point on earth the aircraft

carriers will be at hour H. They constitute mobile bases, lost in the vastness of the oceans.

Herein lies its great superiority over the fixed bases of the Air Forces.

I must have looked dazed. He added:

-To understand me, you should know that the supporters of the strategic bombings, whether aviators or marines, assume that the next war will not last more than two or three days. It will be won by the power that hits hardest, during the first six hours of combat.

- On the contrary, the supporters of the tactical use of the atomic bomb, like Killian, consider that the war will last at least ten years, if the defense is organized in the European continent. He claims that in order to achieve victory only through strategic bombers, it would be necessary to obtain the total destruction of the enemy's organized forces.

This has an ideology that does not allow capitulation - it is impossible for a communist regime to accept capitulation by entrusting itself to a non-communist successor; The only solution will be to bury everything under the rubble.

In a war that faced a continental power, the relations

that would develop are unprecedented. When occupying a foreign territory, an army is obliged to maintain order, at least to ensure production and supply. Between occupier and occupied, relations arising from the same occupation are established, and the way in which it is carried out ends up creating a dialogue that predicts what will be, necessarily, once peace returns.

But between the bomber who throws his bomb on the citizen and this citizen, what dialogue can be established? Before the "earthly", the "bird man" behaves as before a different species, without distinguishing between being occupied and occupying - since he is oblivious to these notions - his object being disorganizing and destroying.

Imagine, for example, France occupied by the Russian army. A threat of bombing of Paris would be an important letter in the hands of the owners of the air. More than four million men, forced to seek refuge outside the city, would create, for the occupant, a situation as difficult as the explosion itself.

Because disorder is also an explosion: that of all organized life. War can only be won when the occupier is in a position to govern the regions under his control. This way of carrying out the war could be the best means to solidarity the civilian population with

the continental power against the aircraft power. The union would not be for ideological reasons, but in a practical way, by instinct of self-preservation.

... As you know, with the strategic bombings, the number of aircraft used in the action is decisive. The bulk framed of bombers in a rigid formation arrive on the sector to be destroyed, and drop their bombs to an order given by the squad's master aircraft.

The crews of the planes that follow are, in a way, a kind of robots. The inferiority of the Russians during the last war has been not to possess a sufficient number of valuable pilots, capable of making decisions during the few fractions of a second that separate the device from the target or the enemy.

They were not prepared for a massive aerial action. This lagoon has been overcome since 1945. Having given great development to strategic aviation, the Soviet Union is now in a position to go on to mass bombardment. Since the success of such a raid rests on the quality of the squad leader, it will not be difficult for him to find a small number of excellent aviators that will be followed by a large number of robots. It is necessary to assume, then, that the two enemies of the next war will depart with equal probabilities for the strategic bombings.

... As for the theories of air tactics, I do not intend to explain them. We will eat with General Devars. He has carefully studied the German campaign in Russia and has forged a new theory of war that he has dubbed the strategy name of the "vertical-horizontal" front.

He wants to talk with you about the morale of the future German fighter. It is very important for him to know if his compatriots will accept or not fight. However, the Soviet intercontinental rocket to have disrupted all Pentagon plans. Wernher von Braun asks for credits to build, in redstone, his "Atlas", which is an improved V-3.

They will probably be granted. In this case, the B-47 squadrons of General Curtis Le May will quickly become old iron. His pilot's heart cannot admit that the "knights of the air" are forced to disappear and that their red button, instead of calling the men, gives rise, from underground coats, robots provided with a "thermonuclear head."

It is like the lord of the Middle Ages who refuses to separate himself from his useless saber after the invention of the firearm. Devers and Killian feel less affected by the appearance of the Atlas. They consider it as an artillery projectile, necessary to destroy the enemy's industrial infrastructure.

He closed his evil eyes and added, as for himself:
-But, for that poor May, what a catastrophe !, the last giant bomber, the B-52, is just beginning to be manufactured in series. Undo your dream: settle in Washington, commanding this device, to go drop bombs on Moscow. But intercontinental rockets will not need General Curtis Le May to go to annihilate the empire of the red tsars!

Second part
Teller's Victory
CHAPTER 8

General Jacobs Devers was waiting for us in a small Hungarian restaurant, located in one of the side streets that lead to the imposing Washington Avenue. He was a sports-looking man, fifty years old. He had a broad forehead, protruding cheekbones, and eyebrows in a circumflex accent. His face seemed constantly tense and he had to make a nervous effort to get to smile. Actually, I didn't even get it, because the smile he gave me when he held out his hand was rather a grimace of circumstances.

-Oppenheimer, you are German- he told me brutally. You will understand me more easily than my compatriots, who imagine that the odds of victory are calculated in millions of dollars invested in the war.

He was so eager to see the food finished, that he was rushing the service with signs of his hands. To explain his strategy he needed a terrestrial globe and a waxed. So, half an hour later, we were sitting in the armchairs of his office at the Pentagon.

-"Let no one bother me," he said to his telephone

exchange; I have a conference.

With a piece of chalk in his hand, and his legs apart as someone preparing to stand for a long time, he stood in front of the tarp. He was still for a moment, with his head tilted back and eyes fixed on the ceiling. Then, with his left hand, he turned an immense relief globe in the direction of the earth's rotation.

"As you know," he finally said in a dry, strong voice, "we approached the" Atomic Stalemar " Soon, for fear of destroying each other, none of the great powers will dare to carry out atomic bombings, either by plane or by rocket. What will we do in 1957 or 1960, when our superiority in the nuclear domain has become useless?

He seemed to ask us this question, but, in reality, he asked and answered himself.

-Will we agree to lose Europe, Asia and Africa as a whole, or will we decide to keep on the "ground" armies capable of fighting in a nuclear war?

He stared at us, his eyes still, small lowered his eyebrows. Add:

-In what situation are we today facing the Russians? -I ask.

This time, it was Lundendorff who answered in our

place. General Devers knew his classics:

- "As far as combat methods are concerned, the next war will begin where the precedent ended," said the German commander on the Western Front of the First World War. And Devers was right.

- What lessons, he continued, should we draw from the last conflict and how can we adapt them to the current situation? In the next war, Westerners will find themselves, in relation to the Red Army, in the same position that the Wehrmacht was in early 1945.

Finally, the decision will depend, then, on the superiority in men, that is to say Russia, because it is evident that Russia cannot be defeated in a combat carried out in the same way as the previous continental wars.

Should it be admitted that the West is irremissibly lost? And that the only salvation lies in the hope of seeing the Soviet Union recede from the prospects of reciprocal destruction, through strategic bombardments with H bombs and, perhaps, even more powerful artifacts?

... No - the general answered himself - we don't give up. We can even win, but with one condition: trigger vertical-horizontal warfare.

And, as a teacher, the lesson began:

-The terms of vertical war and horizontal war must be explained. The first destroys the unity of the operating space, since it is only the air forces that oppose the ground forces. The enemies are in two different and overlapping geometric planes.

The ground forces will try to destroy the enemy that flies at a height between a few hundred feet and fourteen kilometers; the air forces will try to destroy the military and civilian land forces. I call this war "vertical", because it is the vertical line that indicates the reciprocal position of the enemies. It would last at least ten years.

... The second, the horizontal war, preserving the unity of the operating space, places the center of gravity of the war, on a continuous front where the main opposing ground forces face. The tactical or strategic bombings, the air support, the launching of paratroopers in the enemy rear guard, the sea blockade, would be carried out with only one purpose: to allow the front line to advance. I call this war "horizontal", because the two enemies are in the same geometric plane".

... What, then, are the odds of Westerners in a horizontal war? Recall, as Lundendorff said, the last conflict and look for analogies with the current

situation. We find them in the springs of 1943, 1944 and 1945, in the Eastern Front of Germany. The Russians had launched, in July 1943, after the Wehrmacht attack was stopped, a gigantic offensive on the Oerl-Kursk-Bielgorod front, facing an extension of 1,000 kilometers, starting at the height of Smolensko, to the north , and leaning to the south, in the Azof Sea.

Overwhelmed by the numerical superiority of the infantry, and of the enemy's armored vehicles, the Germans first resorted to a method of defensive tactics that the high command of the Red Army had unintentionally taught them, for lack of coordination, in 1941: they were abandoned units in the Russian rear guard to constitute "hedgehog positions", intended to retain a portion of the enemy troops away from the first line of combat.

Even the Stalingrad site had played this role. This tactic allowed the Wehrmacht to regroup and stop the offensive through a series of counterattacks. In general, it is considered that the Soviet offensive had been arrested according to Clausewitz's doctrine at the limit of the offensive, that is, the point where the victor, exhausted by his effort, is forced to stop.

In reality, this principle was denied during the last war each time the attacker was able to retain material

supremacy in the field of operations.

The same phenomenon was repeated, in much greater proportions, in 1944, when the Russians, from the Pripet region, were arrested in the Vistula. The hedgehog positions of Grodno, Brest-Litovsk, Pinsk, Tarnopol, etc., helped the Wehrmacht to resist the Soviet tide. On the contrary, in the spring of 1945, the red army was not stopped because the German high command could not sacrifice units in the enemy rearguards and the limited space that remained did not allow a defense in depth.

As I said, this defensive tactic involves deliberate sacrifices of a part of the troops. Westerners are, therefore, from the numerical point of view against the Russians, in a situation analogous to that of the Wehrmacht in 1945.

... Will it be necessary to leave Europe? No. The men who can only conceive the front as a continuous line, like the good of Ike, for example, who has never understood what a vertical-horizontal war is, do not give enough importance to the aerial dimension that makes the theater of operations a unitary space of three dimensions.

The aviator can only display all his possibilities in this vision of war. Because, it was even more impressive

than the results obtained by her in the course of the strategic bombings of the preceding conflict, is the role she successfully assumed by joining Berlin with its peripheral bases through the famous "air bridge" during the 1949 blockade.

It was there that Curtis Le May, who had moved to Europe to lead the operation, demonstrated his capabilities and not when he destroyed the houses of Saint-Nazaire, without touching just the base of submarines carved into the cliffs. If they had had the same degree of air supply, the besieged forces of Stalingrad could have continued the struggle for an indeterminate period.

It could be said that the "hedgehog" position, like any concentration on narrow terrain, would be an excellent target for atomic bombings. It is accurate, with the condition that it remains motionless, but from the moment it travels, its terrain is extended, it is broken, it is not an easy target. Radio communications, protection, tactical support and vertical supply, carried out by their own aviation, will grant them decisive operational autonomy.

This death lesson was exciting in an office with large open windows over a park full of birds. Despite a somewhat difficult vocabulary, we followed the presentation. I have never been able to understand

well that the scientist wanted to become a military!

- It is evident - the general continued - that, in a modern war, the autonomy could not be made mobile without the aid of the battle car and of the aviation. As your friend Teller can confirm, we are in a position, today, to build a hundred-ton automatic tank that will travel at a speed exceeding one hundred kilometers per hour. No obstacle, houses, bunkers, etc can resist it.

... Regarding the use of the tank, we also have two theories. The first one sees in him, an accessory weapon destined to support the infantry; the second considers it as a tactical operative weapon that, reunited in divisions and in army corps, can aspire to autonomous action. This last theory, in my opinion, is the one that best exploits the nature of the battle car and movement.

To deny him this faculty is to ignore his destiny. Badly used, the tank may appear, as some claim, outdated. Placed on its own element - the movement - dominates the battlefield.

... According to my plans, the new German armored division must comprise 800 automatic tanks, complete with 300 rapid reconnaissance armored cars, an engineering battalion, an anti-area artillery group, an

anti-tank group and a transmission group.

It will thus form the ideal constituent element "hedgehog" mobile, with the condition that all complementary formations are equipped with blinded vehicles that will allow them, on the one hand, to follow the tanks on the battlefield and, on the other, ensure their autonomy on the terrain.

These requirements must be met by the three regiments of "tanker grenadiers" of the light armored escort division, which I call "stone age grenadiers", because they will have to travel in regions completely devastated by tactical atomic bombs. In fact, they will not be able to count on the roads to move, nor with the houses to protect themselves, nor with a supply coming from the population (there will be no longer inhabitants) or from the land (this will have been transformed into desert). They will move in a space where, in reality, life and civilization will have disappeared.

... Organized in this way, these armored divisions would be completely independent of their rear. At the same time, they would be in a position to pierce any normal concentration on the battlefield, and, in case of Soviet mass concentration, the mobility of the use of the battle car would allow them to quickly answer a counterattack and avoid being besieged.

If the armored divisions have suffered serious failures in the course of the last war, it is only because they were immobilized because of reasons dictated by the overall situation of the combat. The needs of the continuous front often forced the High Command to fix the battle tanks in rigid positions. They then played the role of fixed fortifications. Without freedom of movement, they were deprived of their main character.

... Let us now relate these facts to an eventual conflict between the Russians and the Western powers. To find a solution to the numerical inferiority of Westerners a solution is imposed: to disperse the forces of the enemy. To achieve this it is necessary to use the atomic bomb. In the Nevada desert we are conducting tests based on this purpose.

Several nuclear bombs are dropped in a limited space. In this way a gap of 20 to 30 kilometers of radius is created, in which no enemy force could subsist. A few minutes later, the "Atomic Combat Teams" will arrive at the positions, transported in gliders or in Globemaster transport aircraft.

I wanted to perform a maneuver in great style during the Dien-Bien-Phu site. Our 4th Infantry Division, true grenadiers of the stone age, was ready to jump into

the holes of the entrenched field. Thus we would have corrected the back of the Vietminh forces. But the good of Ike retracted at the last moment.

... Also, let's not forget that the use of tactical nuclear weapons prevents the enemy from concentrating significant forces in a small space. A single H-bomb would have been enough to destroy the armored forces that Hitler accumulated in front of Sedan in 1940 in order to cause the definitive rupture of the French Front.

The red army would march, then, undoubtedly to its destruction in the event that it tried to group the bulk of its forces behind the iron curtain.

On the other hand, the Russians, knowing that we can open atomic holes, which we would fill with men at every point of the territory they control, would be forced to keep garrisons throughout the space under their domain.

Already in 1947, I was of the opinion that the United States army should be able to reach the first, by air, at any point on the surface of the earth. The object of the General Staff should have been to convert each division, including artillery and armored vehicles, into air transportable.

The C-124 Globemaster aircraft can, in effect, carry thirty tons to more than 2,000 kilometers. Certainly, this is not yet enough. At the moment, only light units are transportable. These can cooperate with the mobile units in the conquest of the localities or strategic points, advancing the arrival of the hundred-ton tanks a little, throwing themselves in the open holes by the tactical atomic weapons or participating in maneuvers of aerial-terrestrial bearing.

The capacity of the Globemaster, however, is sufficient to provision an army in food, ammunition and spare parts. We will need thousands of "Berlin blockades", supplied by thousands of "air bridges", to win the battle of Europe.

We were a little amazed at this fruitful coldness and this apocalyptic evocation made by a technician. But, always excited, the general continued:

-If they want to have a vision of horizontal-vertical war, it is necessary to imagine several groups of "hedgehogs" preferably composed of a heavy division equipped with automatic tanks, followed by "stone age grenadiers", motorized, drilling the enemy front and starting, as comets, a march through the territory located in the rear.

These groups would not have the mission of knowing if the enemy has been rejected or if the adversary

continues his advance in the opposite direction. Supplied and protected by aviation, a mobile "hedgehog" could move towards Warsaw while the red army headed towards Paris. According to the possibilities of the land, it would leave in its path, as in the quadrilateral of Bohemia, for example, the transported infantry that would end the occupation of the territory.

At the same time the coastal regions could be cleaned, where the navy would land heavy material. War would exist, potentially, everywhere. Above these mechanical troops, our planes would constantly glide like a flock of birds in a sown field.

The enemy, on the one hand forced to chase or intercept the armored vehicles that would march zigzag over territory to open a possibility of landing fresh troops, and on the other forced to be prepared to intervene against the atomic Air Forces that would be thrown into a hole open in its defense by the nuclear weapon, it should disperse its forces to the maximum.

The battle could take place at the same time in Kiev and Lyon, in Lemberg and in Milan, in Paris and in Stalingrad, in Bucharest and in Brest. Inside the land of no one who would be created among the main centers of action, the paracidists, the airborne troops would descend without running the risk of finding

powerful enemy armored forces.

Such a strategy obviously implies a clear superiority in the air. If our factories work at full capacity, we will have it within ten years. In addition, the Atlantic forces would have the freedom to choose their objective, while the Russians would be forced to bomb their own factories and their own cities, to dislodge the enemy groups that would have been embedded in the space that, theoretically, should be able to dominate .

The civilian population would no longer find themselves as in the vertical war, in the front line, but between the lines and, by the political choice they made, they would favor one or the other of the belligerents.

... This picture of operations is the same capable of satisfying the vision of a modern strategist who no longer observes the continents and the oceans on a single map, but the globe of the earth in its true form. Viewed from above, the fronts of this war would look like sunspots, with the difference that these manchs would constantly change shape and place, like the channels of the planet Mars.

Is it necessary to add that only such a strategy can tip the balance in favor of the West? Rest on the superior quality of its men and its industry, the only real

advantage that the free world has over the Soviet masses. Grant the initiative to the Atlantic allies from the beginning; the enemy sees his industrial production constantly scattered and his communications interrupted, while the Westerners can keep their air supply roads open and keep their arsenal - the United States - away from land fighting and strategic bombing.

Because the Russians would have no interest in throwing a bomb on New York knowing that we would throw three on Moscow. In the modern strategy, with three dimensions, the geometry of space and dispersion replace flat geometry and the concentration of military art of the past.

General Devers seemed very pleased with his presentation. His eyes seemed to follow the atomic combat units that advanced in a desert that would extend from Gibraltar to the Urals.

-What do you think? -I wonder.

"It is very logical," I replied, "but what would you do of the hundreds of millions of Europeans who would be left without protection, who would not have work, because their factories and fields would have been devastated?"

-It is a question that does not concern the military. It

corresponds to the economists, in charge of reconstruction.

THIRD PART
Part 3
Apocalypse
o Golden Age

The engine of my plane started. From the platform of the Washington airport, Teller and General Devers, who had accompanied me, made friendly signs. They were truly very kind. They would have given, without hesitation, to their last dollar to come to the aid of a friend. Teller has not stopped listening to his Livermore collaborators when they need your help.

He was interested in all the little miseries of everyday life. One day, my wife told him that the doctor had found Johnny a bit anemic. The "father of the atomic bomb" sent us to send all the new medicines from the North American laboratories and telephoned every week to hear from our child.

I have rarely encountered a more noble and better man. He was the first to intervene in favor of Robert Oppenheimer when he fell out of favor, and became the target of Mac Carthy's demagogic attacks. "If Bob's loyalty is called into question, I submit my resignation," Teller had written to the president of the Atomic Energy Commission, Admiral Lewis Strauss. There was nothing common between the cynical brutality of Hartmann, my former companion of Innsbruck, and the heart of Samaritan Edward Teller.

But, both one and the other, they looked coldly at the destruction of our planet. This perspective did not

frighten them. It was inevitable? Wasn't it because I wanted to continue my little train of recovered bourgeois life, which resisted the evidence?

In Washington, everyone talked about war, not as a hypothesis, but as an inevitable event. The only questions asked were: when and how?

The plane had gained height. Underneath it was seen, in the penumbra of the terrifying, the field sown of streams, mountains crowned with smoothly rounded ridges. From time to time, in the middle of the cultivated fields, the small lights of a farm shone. However, the quad-engine was approaching the most important industrial region in the world. We were going to fly over the huge steel foundries of Pittsburgh, and leave to the right, the Detroit automobile manufacturing chains to make stops in Chicago, which, with its six million inhabitants, is larger than the capitals of the Old World, Paris or what was once Berlin.

But all this must seem infinitely small to the "bird man" of General Devers. As you climb, things get smaller. Since man has conquered the air, there are no longer borders to ensure his protection, nor security.

In other times we believed that our life and our happiness was terrestrial. But now, before the death

that falls from the sky, we find ourselves without defense. To free himself from the paralyzing fear, this disease of the modern man, who, like that of the thousand years, scrutinizes his sky fearing that it will not fall on his head, General Le May is willing to wear the armor of St. George to crush the dragon, before his wings have grown.

In technical words, he calls this preventive war or strategic defense action. And trying to break free from fear has become an act of desperate courage. How simple is the program of the brave general Le May! Manufacture bombs and airplanes in large numbers in order to take an important advantage over the adversary. When this safety margin has been achieved, it will be supplied with fuel and explosives, and will be launched over enemy cities.

The faster and more radical the operation, the more it is killed and destroyed, the more successful the success. But what will happen if the operation fails? If the "Curtis Le May" in Moscow, before dying under the rubble, had time to press his red button?

Then, the American B-47 and B-52 on one side and the Soviet TU-4 on the other, the Atlas and the M-103, equipped with thermonuclear weapons, will cross over the North Pole and the Mediterranean to meet Your mission on the "objective."

The "objective" is an extremely comfortable military term. Represents a point on the map. But let's especially avoid examining it with the microscope. The blood and ashes, that could be observed, could affect sensitive souls ... that will have time to harden during the ten years that the next crusade will last (they are words of General Devers).

-But if it's not me who presses the button, it will be my twin brother from Moscow who will- says General Curtis Le May to defend himself.

-No – answer the supporters of the forced peace. The adventure is too risky. But the stronger we are, the longer "they" will last to cause the catastrophe.

We know the argument of these new disciples of the old "si vis pacem para bellum" (if you want peace, prepare war). According to them, we must always build more bombs A, H, C, Z, and always develop more ground, sea, and air forces, in order to be sure that we can destroy the enemy. That way he won't dare to kill us. And how long will this race against death last? What change will cause permanent and reciprocal terror in society?

Military experts do not answer these questions. Your task is to prepare war plans and create the premises

of victory. The rest corresponds to politicians and economists. As for us, poor atomists dispersed by the wind over the earth, we have become explosive manufacturers.

Among the specialists of our supercivilized century, no understanding is possible. We speak different languages. For the military, the "atomic era" means having a more powerful explosive than its predecessors. They review their battle plans based on the destruction radius of their new projectile.

They have imposed the unit of measure of our products. It is expressed in thousands or millions of tons of T.N.T. They are not interested in our measures, the "erg" or the "mev". Actually a small ping-pong ball bounces with a "power" of a few thousand erg. What meaning can this "erg" have on the scale of the planet turned into a theater of operations of its horizontal-vertical war?

Politicians, on the other hand, are more interested in the peaceful use of the atom. Curious by nature, they listen with interest to our exhibitions. But they always have something more urgent to do. The atom has waited for centuries before freeing its energy. Therefore, you can wait patiently until after the next election or until the conclusion of an important debate in the House or Senate.

In the century of great journeys, when European navigators discovered distant lands, was it by chance how researchers of the time had discovered the compass and sextant; How astronomy and science have progressed by leaps to allow the captains of the caravels, to conquer the oceans and the world?

Europe, destroyed by religious wars, unable to meet the needs of its agricultural population too dense for the time, needed space. However, its inhabitants had barely exceeded one hundred million, but you had to be a lord man to buy tomatoes. A small amount of sweet peas cost fifty talents, a thousand dollars today. Our ancestors, tortured by hunger, killed each other under pretexts that now seem incomprehensible to us.

To resolve the differences between supporters of the sacrament in the form of Holy Host and those of the sacrament celebrated with whole bread, just dipped in wine, ten million Europeans died during the Thirty Years' War.

The Old World could only be saved from its self-destruction thanks to a Copernicus, a Galileo, who revealed to them that the earth was large and round and that beyond the oceans there were other continents, and enough resources to satisfy their

hunger.

Today, there is not a single corner of the habitable land where the flag of a great power does not float. We have made the inventory of all our wealth. But in the meantime, the 300,000 million men who populated the world, have become two and a half billion in three centuries.

We are again too numerous. Will we have to jump the planet that can barely contain us anymore? In fifty years - demographers show us with statistics - the earth will have 4 billion human beings to feed. If it is necessary for some to destroy the others so that they can live, then the intercontinental rockets, and the increasingly varied series of nuclear weapons are ready to fulfill their mission.

Death will no longer be sown in an artisanal way, by ridiculous small cannons, not by bombs barely capable of crushing a building.

From now on, destruction is possible on an industrial scale. A capital, millions of enemies, will be pulverized at once. Serial death production is an easy thing. However, it would be wrong to justify these future catastrophes by overpopulation.

As historian Willem Van Loon observes, however incredible it may seem, if all those who live in this world measured 7 feet (1.80 meters) high, 20 inches (0.50 meters) wide, and 14 inches (35 centimeters)) thick (our average current dimensions), the whole of humans could be enclosed in a large cubic box of 900 meters side.

Can you believe it? It would be enough to do the calculation to convince yourself of it. The size of this can of sardines will not increase significantly when humanity has reached 4,000 million. Why despair, then, of the future and not believe that there is enough room on earth for all of us? The problems to be solved are no more difficult, no more complicated than before, when all the work was done by muscular strength and the man was forced to wear himself out, from dawn to dusk, to get his food.

The conquest of space, the steam engine, the explosion engines, raised their standard of living in a revolutionary way. Today, the energy extracted from classic fuels (coal and oil) provides each American citizen with 300,000 calories per day, that is, one hundred times more than the muscular energy produced by the strongest man.

A gram of Uranium 235, whose volume represents one tenth of a cubic centimeter, and ten tons of coal

produces the same amount of energy, and we are only at the beginning of nuclear science. As "bright" as the results of our explosions may seem, we still don't know how to use more than 5% of the energy locked in the Uranium core.

But it is as crazy as it is false to believe that this force could only be used for destruction. Today we are already able to build giant ships and transport planes that could sail almost indefinitely; we could raise water to the level of the mountains to irrigate uncultivated land, or use the oceans to fertilize deserts. This is not about fantasies, or anticipations, without the routine use of the new energy we have.

Yes, we could do much better if the atom were free to create a civilization according to its own law. Taking advantage of its strength, all natural, mechanical or mineral energy sources would be useless. Human beings would no longer need to concentrate in a limited space, to be the prisoners of a coal or steel deposit, a waterfall or a waterway.

They would no longer be slaves of industrial civilization concentration that piles up in urban centers tainted by smoke from hundreds of fires. Energy would be found everywhere and in infinite quantity. The transport of goods and materials would no longer pose problems, because distances would have been

overcome.

Today, North Americans are proud to travel the 5,000 kilometers that separate New York from San Francisco in just 12 hours. But tomorrow, with an atomic propulsion apparatus capable of reaching the speed of 10 kilometers per second, the great ports of the Atlantic and Pacific, would be less than 10 minutes from each other. The cities of Russia and North America would be closer, in transport time, than the peripheral neighborhoods of the center of a city today. New York would be closer to Rome than the Parisians of the Gate of Versailles, they are today from the Gate of Clignancourt.

And that's not all. 70% of the world's inhabitants are farmers. A minority, Americans and Europeans, work with perfected machines that modern technology puts at their disposal. The rest, in arid soils, in the marshes infested with malaria in South Asia, in the Nile Valley or in the dusty plateaus of India and Iran, in rice paddies in Japan and China, work by corn porridge or a handful of rice, from dawn to dusk. Their women give birth many times in the field, in full work. While the life span of the civilized is about 70 years, theirs does not reach more than 23. They are the hundreds of millions of famished people of the little developed countries that constitute the immense reserve of the hatred of the humanity.

Already in 1933, the German chemist Senggenberg had made his "tin prairie" in his laboratory in Berlin. He had sown, in metal grids, fifty kilograms of corn seeds, watered them twice a day with a nutrient solution and had collected, after ten days, 300 kilograms of seeds.

There are currently more than twenty laboratories that carry out experiments with nutritional solutions. In the United States, in San Francisco and to be even more exact in the number 1,155 of the Scenic Avenue, there are plants that seem to leave a fabulous country.

Tomatoes reach a height of 30 feet, linking in armor the size of a house, and produce about 317 tons of fruits per acre, that is, 40 times more than the average North American yield. The "estate" of Dr. William Frederic Gericke, a professor at the University of California, also contains tobacco plants of 6.50 meters. In a bucket of 400 square feet, it has collected more than 900 kilograms of potatoes, that is, ten times more than the maximum production achieved in agriculture. This vat is full of a chemical solution, since Dr. Gericke's rooms do not contain even the smallest plot of land and feeds his plants with the help of chemical solutions.

Before the atomic era, these experiments only had a

scientific interest. They were too expensive to replace traditional agriculture. Indeed, the substances necessary to grow the plants inside tin boxes, must contain radioactive products. As already said, there is a small amount of radio on the earth and the other sources of classic radioactivity were also too expensive.

Today, thanks to nuclear science, all elements, from the lightest to the heaviest, can become radioactive. This means that the cereal factory, the machinery for making pulses, will be possible when the atom disintegration is no longer considered, as the most practical means to send us "to the other world".

In North American laboratories, plants bombarded by gamma rays and fed by chemical substances have already matured in 24 hours. The farmer who plows, sows and waits 8 months to collect, is destined to disappear as the craftsman of the Middle Ages has disappeared, transformed by the machine. There is no reason to be tender, to praise the virtues of country life, to idealize the ancient wisdom of the people who work the land.

However, one does not see where wisdom lies in making humanity's daily bread depend on the blind forces of nature. Hail, a drought, floods are enough to kill millions of Chinese farmers in dire years. With the

food factories, a block of one cubic kilometer will suffice to produce the amount of wheat needed to 40 million French. There will no longer be poor countries, nor rich countries. Actually, if we want to start the "civilization."

Everything that existed before, all the achievements of our century, which we consider as the century of progress, our factories, our railroads, our tractors and threshers, will resemble the man of the future, rudimentary, prehistoric instruments. It is absurd, therefore, to cling to a past way of life solely because the new one is not known.

This is not about lucubrations, nightmares or fantasies of an atomistic physicist who, bent over the instruments of his laboratory, has lost contact with life.

This is your children here, my son who waits for me at the end of the "track" in the far west of California, in this ancient desert transformed by man. If they are not destroyed by our bombs, they will be witnesses of disorders that will seem insignificant to those who have known the oldest of us.

Knowing what the world of the future will look like is not an academic issue, but it is a matter that interests us personally. Our life and that of our children depend on it. That I am not told that the reserves of Uranium,

the raw material of the new era, are limited, and that it would be dangerous to base the future on such a rare metal.

Today, from iron to Plutonium, everything is a source of energy. I affirm it with knowledge of cause. And it is this discovery that has decided me to write this book. I cannot go into technical details, but thanks to the giant cyclotron of the University of Berkeley, this hypothesis has become a reality.

Already in 1935, the Japanese scientist Yukawa had had the intuition of the existence, in the nucleus of the atom, of the *inn*, an intermediate particle between our old acquaintances, the neutron and the proton. The role of the *inn* is to ensure the cohesion of the nucleus of the smallest fraction of matter.

After very complicated calculations and multiple technical innovations, we have managed to carry out the "mesonic bombardment", as Fermi achieved twenty years ago, in his laboratory in Rome, the neutron bombardment of the Uranium. We have chosen, for our experiments, the most stable metal: copper, whose binding energy is very high. For a long period there was no modification inside the element.

I had left the laboratory at dawn, convinced of the failure of the experiment. I was preparing to write my

report on "the unwavering nature of middle mass atoms", when Bill called me on the phone to say: "It's a boy". Copper fission core fission had occurred. The calendar, on my table, marked the date, November 3, 1954.

Fifteen years earlier, Otto Hahn had obtained the fission of the Uranium in Berlin. It was the beginning of a new era. From now on, I could say, in my report, that the explosion of all the elements had become technically possible.

The newspapers dealt that same day with the indiscretions of the American "comadre" Elsa Maxwell. These were scandalous facts about the intimate life of the Duke of Windsor, and the mysterious death of a young Italian, whose body had been deposited, after an orgy with narcotics, on the beach, by the unchristian son of a democratic minister .

There was also talk of new insults that Germans and French exchanged again taking as a pretext, this time, the coal mines of Saarland. An American deputy acknowledged that he had never parachuted into the German rear guard, as he had intended to obtain the votes of the electors.

They dealt with the trip of the Negus of Abyssinia to Europe, and the reasons that had caused the divorce

of Bobo Rockefeller, the third or fifth wife of the son of the king of American oil. But there was no talk of the inn, and everyone continued to ignore that everything he touches becomes explosive. And that, by throwing an old can of trash in the trash, thousands of tons of T.N.T. they neglect or power able to run a car engine for years.

Who, therefore, would be responsible for warning human beings? Politicians are the prisoners of a retrograde system of thought, whose bases have been destroyed a century ago and are even willing to sacrifice their peoples to defend archaic ideologies.

When Adam Smith, the father of "free exploitation," so dear to the Anglo-Saxons, wrote his works, the steam engine had not yet been invented and the royal palaces were lit by spark plugs. When Karl Marx wrote his work "Capital", the railroad was a revolutionary innovation. All these ideologies have been based on a world destined to disappear. Today, in the atomic era, supporters of "free exploitation", and collectivist Marxists are as ridiculous as the military who would like to think about war by gaining a sensational discovery: gun powder.

In the same way as the super-strengths of General Curtis Le May, they have become fireballs compared to the Wernher Von Braun Atlas, the Pittsburgh

foundries, the Ruhr or Dnietropetrovsk forges, are outdated facilities compared to the factories that They will be born from the atom. The millions of dollars invested in the Chicago companies and the millions of hours devoted to the realization of the five-year plans will have been wasted.

You must start all over again. Seen from this perspective, the discord between "free exploitation" and "collectivization" is as futile and incomprehensible as disputes over mere formal issues that have decimated the European peoples of the Middle Ages.

I am not a politician. I don't belong to any party. All ideologies seem equally false to me. But I feel, strongly, that we cannot live in a world divided in two, and under the constant threat of being destroyed. I also know that the atom can create a new civilization, if the last "stage" does not serve as a weapon, for the world final that is supposed to face the two powers, which is still standing after the semi-final of 1939-1945.

If this catastrophe occurs, the globe will have become an uninhabitable desert, where, in order to live, in the chaos of dilapidated cities, it will be necessary to be equipped as the "Stone Age grenadiers" of General Devers.

This cataclysm threatens to occur at the precise moment in which, after thousands of centuries of misery, man reaches the threshold of the fabulous era, at the moment when it becomes technically possible to produce food for his hunger, avoid the torture of the cold and from heat, free him from the yoke of the blind forces of nature, finally organize a society according to his character: that of true freedom.

If he realized the magnificent adventure, which can begin in the twentieth century, he would not admit that ignorant bosses, convinced to find themselves on the "line of history", and that, in reality, they are the exponents of an concluded age, force you to cross the red sea of blood before entering the promised land of the future.

The war between rich and poor, between proletarians and capitalists, is absurd today, since the atom can make them all rich. But we smash towards the catastrophe, as if the atom's civilization needed, to establish itself, to destroy the civilization that preceded it.

I recognize, however, that the atom is the enemy that the men of our day fear, as our ancestors, ignorant were suspicious of the train, were opposed to electrification and considered the plane as an mademen instrument.

According to them, it would have reached the stage of history *"in which security would have been born of terror and survival would have become the twin sister of destruction"* (Winston Churchill).

But, if at least young people try to get rid of the nostalgia that attracts their elders towards a picture of life unable to admit the existence of the atom! This will only be beneficial if it creates a world civilization, a single world civilization over our entire planet.

In the same way that it was impossible to preserve the feudal order of the Middle Ages, after the appearance of gunpowder, it is impossible to continue today in a world divided into small autonomous territories. The British are already building bombs A and H. The Swedes and the Swiss are also about to produce them. Tomorrow, each people will be forced to possess them, in the same way as it has been necessary for all armies to adopt the artifacts used by the great powers in the course of the war.

Where will we go if the atomic destruction comes to the hands of a Yugoslav chief or a Chinese fan? And even worse. Groups of individuals, gang of gangsters or political fanatics, in a very short time they will be able to have their pocket-sized atomic weapons, since they will become as common as firearms are today.

Can you imagine a society in which the bosses of rival parties, and the bosses of gangsters will find themselves in a position to reciprocally threaten atomic destruction, as the superpowers do today? A piece of metal, the size of an orange, in the hands of an irresponsible, will be as fearsome as an intercontinental rocket.

On the other hand, the same peaceful use of atomic energy cannot be conceived except on a planetary scale. Take, for example, "climate surgery", the first practical application of nuclear energy and in which the Russians are currently working.

The climate is a balance between multiple factors: air and sea currents, high and low atmospheric pressure, etc. And, of course, the smallest change in the relations that exist between these forces can have (and have) repercussions on our climate - even if this variation takes place thousands of kilometers from our country. Thus, the disappearance of a forest in South America can modify the winds of Africa; The opening of the Suez Canal has caused an increase in temperature in the Mediterranean basin.

The main factors that influence the climate of Western Europe, are the warm marine currents that form in the South Atlantic, the cold waters that descend from the

Arctic regions, the hot air masses that rise from the Mediterranean and the cold winds that They are born in Siberia.

Western Europe is, therefore, located between two opposing sources (marine and terrestrial). On the one hand the warm sources of Africa, Mediterranean and South Atlantic; on the other, the cold sources of Arctic and Siberia. The smallest variation of these four factors produces important effects. For example, in 1910, there was a sharp rise in temperature at the North Pole.

The fusion broke the masses of glaciers and icebergs, high as mountains, descended to the South. Consequently, cold waters penetrated further south into the Atlantic. The balance was broken with the warm currents that rise from Ecuador. The rainy area, usually located over Scotland, spread throughout France, the Netherlands and northern Germany. The rivers of Europe received an abnormal amount of water: there were floods.

A similar phenomenon occurred in the course of the winter of 1954. No iceberg was actually signaled in the North Atlantic, but cold currents descended along the Norwegian coast, to the North Sea. The rain zone slid eastward. It covered the English Channel, France and Germany. Would an Arctic thaw have taken

place?

- "No," the meteorologists responded, certain scientific and military observers replied, "there has been an artificial Arctic thaw." Iceland's fishermen have seen northern lands normally covered with the white layer of winter, free of ice. What happened?

The Russians, for two years, are dedicated to a gigantic task: the metamorphosis of the Siberian climate. It was the engineer Davidov, who in 1953 proposed the project. He immediately received the approval of his government. This plan foresees the creation of two artificial seas in the interior of Siberia: one by immense dikes, built on the Yenisey River. These works, according to Davidov himself, should be a thousand times more important than those that had been carried out to excavate the Suez and Panama canals. The waters of Obi and Yenisey should take ten to eleven years to submerge territories destined to become seas.

However, gigantic dikes would not be enough to give a Mediterranean climate to the Turquestan steppe. To achieve this transformation, thanks to which one hundred million people would try to inhabit that region (as large as France twice), Davidov planned to destroy the "fridge": this is what he calls the North Pole. According to him, the Arctic cold is only partly

due to its geographical position. The factors responsible for the rigorous climate of Siberia would be the ice that accumulates in winter, and the Sun that fails to melt them during the summer.

The North Pole lowers the temperature of the surrounding regions, like a piece of ice inside a refrigerator. And, since the solar heat is insufficient, why not use man's heat source, the atomic bomb, to destroy the ice on the Pole?

The hundreds of millions of degrees it develops can conquer, through underground explosions, thousands of square kilometers to the Nordic lands. In this way, the Obi and the Yenisey, which are only navigable from July to October, could, like the rivers of Western Europe, serve as a communication route throughout the year and the vast expanses of land between the Caspian and the two Siberian artificial seas would become, thanks to climate surgery, with the disappearance of the "fridge", a true paradise.

Work began in early spring of 1954. The atomic offensive against Arctic ice was evident. Last December, 300,000 young workers set out to populate and put into production the desert areas of Turquestán.

These improvements in nature obtained in Siberia

have already caused floods in Europe. Tomorrow, the Old World climate may change radically. The flow of the rivers would increase in winter, as a result of abundant rains, and the summer would become warm and dry, like that of the tropical regions. While the exact mechanism of meteorological factors is not yet known, it is known at all what to expect.

Europeans are in danger of seeing that their climate becomes one similar to that of the Iran plateau, while Siberia becomes a paradise. Unable to live longer in their impoverished lands, they must request authorization to settle on the shores of the artificial seas created by the engineer Davidov, or try to force the Russians to cease their jobs. Like it or not, the world will be tomorrow the theater of operations of a war of world destruction or our united and indivisible homeland.

He was immersed in these meditations when the plane described a great curve to be placed, before the runway of the San Francisco airport. A few moments later, Johnny and his mother made signs to me. As a child, I left the group of serious and balanced gentlemen with whom I had returned from Washington and started running on the cement platform that led to the doors. Gentlemen wearing hats with colored ribbons and multicolored ties, watched me run like a rabbit. They smile showing their big white teeth. They

should take me for a madman or for a lord eager for publicity.

I had no cure. At this moment of my inner dialogue, I had so much need for a company, for a warmth, for self-confidence and life, that it gives a single good, sweet and warm look fixed on us, that I could not have done , in passing, the five hundred meters that separated me from the only loved ones for whom I am truly unique and irreplaceable.

Ida saw me arrive with tears in my eyes. Her feminine intuition, stung by her love, had warned her, long ago, without me noticing, of the drama that dominated me. Because it is really a drama that a man of my age realizes that he is attached, after years and years, to a monstrous task.

I have voluntarily suppressed, in this book, the return of Ida. It will be the subject of a new story, very different from this one, although its main motive is the same: that of the horrors of war. After several strange weeks when we met again next to each other, not daring to say a word, or make a gesture, as if we were afraid of hurting each other, love was stronger than anything: Ida was again my wife and I her husband.

Meanwhile, in order not to disturb her - from the Russian occupation of East Germany, horrors had

been buried at the bottom of herself, horrors that made her wake up abruptly, trembling - in order to accustom her flesh, and her spirit to the idea (which seems extraordinary for those who come back from hell), that happiness is a possible thing, that peace is possible, that happy, pleasant life, divided between the pleasures and normal sorrows of the family, and the joy that give the study, it is possible, I had never made him participate in my anguish.

However, she had perceived them! When I left for Washington, I had guessed I was uneasy. And in the car that took us to the present, while Johnny played with a miniature movie machine that had brought him from the capital, Ida put his hand on my arm and said -What's up, Erwin?

I felt his head slip smile my shoulder. And I started talking to him, quietly. The conversation resumed at home, once she had accompanied Johnny to bed. Dawn caught us talking still.

This book was born from that conversation, from that long soliloquy. I wanted to demonstrate three things:

In the first place, the war to the death of the atomist scientists inside their secret cities.

In the second place, the fragility of our knowledge,

fragility that prevents us, practically, foresee in its entirety the damages that an atomic war will cause.

Finally, opposed to the apocalypse, the golden age that can give the world atomic peace, capable of making tomorrow a peaceful confederation of the peoples of the earth.

The "realists" - who, however, in each war are surpassed by the realities of a world ten million times faster than they will - strike this utopia project. It's possible. I am not a politician. I am nothing more than an atom technician. But, precisely, this allows me to say to men of all countries:

- Unite, unite quickly, or it will not take long to perish.

March 1955
ERWIN OPPENHEIMER

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